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V. F. V.

GILBERT HART.

CHAS. A. STRELINGER.

A BOOK OF TOOLS,

BEING A CATALOGUE OF

TOOLS, SUPPLIES, MACHINERY,

AND SIMILAR GOODS

USED BY

MACHINISTS, ENGINEERS, BLACKSMITHS, MODEL MAKERS,
FOUNDERS, MOULDERS, DRAUGHTSMEN, INVENT-
ORS, AND AMATEURS.

AND IN

MANUFACTORIES, MILLS, MINES, ETC., ETC.

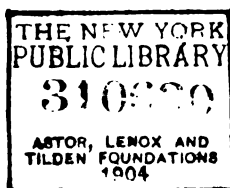
CHAS. A. STRELINGER & CO.

MANUFACTURERS AND DEALERS,

DETROIT, MICHIGAN, U. S. A.

Extra copies sent free to any address on receipt of 25 cents to cover mailing expenses; or handsomely bound in Cloth, 75 cents.

If this Book is of no benefit to you, kindly hand it to some one who may (perhaps) prize it.



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To both of the above concerns we owe our thanks for their careful, prompt assistance, and we can heartily recommend their services to any one in need of high-grade Printing, Binding, or Wood Engraving.

NOTE—This is about the only "Puff" in the book, and is entirely gratuitous.
C. A. S. & CO.

THIRD EDITION, 50,000 COPIES.

PREFACE.

In presenting to the public this, the Third Edition of "A Book of Tools," we cannot refrain from expressing our thanks to the many kind friends who have encouraged us, first, by word of mouth; second, by commendatory letters; and last, "The best of all the game," by frequent and liberal orders.

The first edition consisted of 14,000 copies. For a book of its class, this was an unusually large number, and judging from our past experience, and that of others as well, this number should have been sufficient to have lasted a year at least. The demand, however, was so great, that in less than four months the edition was practically exhausted, and the mechanical public, like Oliver Twist, was "crying for more."

The following letters are printed purely as a matter of conceit. They all came to us unsolicited and are from representative people and concerns. Our friends think they make us feel "stack-up," and maybe they do.

COLLEGES AND TECHNICAL SCHOOLS.

"It is the best thing of the kind I have ever seen, and I have pretty much everything of the sort there is."

EDGAR KIDWELL,
Michigan Mining School.

"Have just received your 'A Book of Tools.' In sending for it, I fully expected to get 'another one of the same.' Instead I got a book which wins one's confidence and good-will at once, by its unique novelty, convenience and comprehensiveness. Pages III to IX and I to 4 are especially good reading, and

full of good sense. Shall make use of the book frequently, and I thank you for it."

O. P. HOOD,
Kansas State Agricultural College.

"I would willingly pay for such books, their value as books, but am grateful for the thoughtful kindness that practically provides them free."

J. B. DAVIS,
University of Michigan.

TOOL AND MACHINERY DEALERS.

"Having had considerable experience in getting out Tool catalogues, let us say to you that the best and finest catalogue we have seen up to to-day, is 'A Book of Tools.'

MONTGOMERY & Co.,
New York.

"If we were asked to name the most progressive Tool and Machinery house in the United States, your name would at once suggest itself to our minds. The 'Book of Tools' received this morning, is only another evidence of the enterprise of your house."

JAS. T. PRATT & Co.,
New York.

"It is the finest work of the kind that has ever come to our notice, and we shall take great pleasure in reading it and keeping it by us for reference. It shows an immense amount of work and thought, and is a valuable publication for any one to own."

CHANDLER & FARQUHAR,
Boston.

"The book should have a place in every library, to say nothing of every shop, factory and mill, and I predict that several editions will be necessary to supply the demand."

J. A. MACLEAN,
Kansas City, Mo.

"We have seen a great many catalogues, but freely admit—without any flattery intended—that it is the best of its kind we have ever seen or read."

REED & AUERBACHER,
New York.

"As a help to the trade for whom it is intended, and a help to your firm to obtain orders, it is the best we have ever seen, pages 1 to 4 being especially very unique and full of good sense."

HIBBARD,
SPENCER, BARTLETT & Co.
Chicago.

TOOL AND MACHINERY MAN- UFACTURERS.

"There is but one suggestion we might make—and our desire to criticize would impel us to make more—if we could find anything to make criticisms about, and that is instead of calling this most neat, complete and comprehensive catalogue, 'A Book of Tools,' it should have been called *The Book of Tools*, for it has no equal."

F. E. REED & Co.,
Worcester, Mass.

"Enclosed find check, for which kindly send us eight copies of 'A Book of Tools'—cloth bound."

BROWN & SHARPE MFG. CO.
Providence, R. I.

"It is splendidly compiled, and I assure you will be of very great use to me. It will be a handy book of reference, instead of having so many catalogues to refer to."

JOHN A. BRASHEAR,
Allegheny, Pa.

"It is in our opinion as valuable as it is unique in the field which it covers. We consider this book thoroughly modern and up to date, and moreover, a valuable addition to the Machinery literature of the day."

ARMSTRONG BROS. TOOL CO.,
Chicago, Ill.

OTHERS.

"Accept my thanks for your 'Book of Tools.' The book itself, and its Prefaces or Introductions, are about the most common-sense things I have seen for a long time. I hope and do not doubt that your enterprise and straightforward 'horse-sensy' methods are bringing you the trade and profit deserved."

ROBERT GRIMSHAW, Engineer,
New York.

"Thank the Lord (and the Chas. A. Strelinger Co.) the 80 and 10 and 7½ per cent is now done away with, and the engineer who does not go on his way rejoicing in the acquisition of a new revelation in the knowledge of prices of his every-day needs, has no one to blame but himself."

JAS. C. TEMPLE, Miner,
Springfield, Ill.

"I am in receipt of 'A Book of Tools' that is as interesting and full of instruction in its own way as a History. And I find it a difficult matter to decide where to keep it—at the house or office—for there are so many different occasions when the knowledge it contains is wanted at both places. Five dollars would not buy it."

JOHN C. ELLSWORTH, Banker,
Fowlerville, Mich.

"To show you how much I appreciate the worth of a good thing will say, that if I couldn't get another copy, one hundred dollars wouldn't buy the copy I now have."

GEO. E. T. ARNOLD,
Inventor and Jack of all trades,
Lancaster, Pa.

"I will not attempt to explain my admiration and appreciation of your 'Book of Tools,' as I am sure you must be flooded with such communications, and if you will select the best and 'copper it' or 'go it seven better,' you 'call me.' The highest compliment one can pay it, is to select a list of goods and send in an order, and this I hope to do as soon as I can determine what I *need* (I *want* the whole thing)."

S. E. COGSWELL, Engineer,
Richmond, Mo.

OUR BOOK OF TOOLS.

A casual glance at this book will reveal the fact, that it is in some ways novel, and different from the ordinary trade catalogue, but it may be well for us to call attention to some of its features.

SIZE.—For many years catalogues have been growing larger and larger, until things were getting to such a pass, that it became a grave question as to whether manufacturers would not have to put up special library buildings for trade catalogues.

In our judgment, the book that is to be constantly used should be small and compact. A small engraving well done is, in the majority of cases, just as useful for the purpose intended, as a large one, and there is no more need of showing a full size cut of a blacksmith's sledge than there is of showing a full size cut of a hundred-foot tape line.

On account of its small size, this book can be kept on the desk and constantly referred to (this is what we like); or can be carried in the pocket, an especially useful feature when one goes out to estimate on work for which various tools and supplies may be required.

**You Can Put
it in Your
Pocket.**

PRICES.—In printing our prices, we have made a radical departure from the time-honored custom of printing manufacturers' lists, which, in our judgment, are absolutely misleading, with their long string of discounts. The system of price-lists has become almost a farce. One manufacturer prints a list price of \$1.50 on an article, another \$3.00 on a similar article, and a third \$4.50. The first allows a discount of 30 per cent, the second 60 and 7½ per cent, and the third 75 per cent. The difference in the lowest and highest list is 200 per cent, while the actual, or net difference in cost, is 7 per cent.

In regard to discounts, we may have something to say farther on.

VARIETY.—We have made an earnest effort to show as complete lines as possible. Some people mistake multiplicity for variety. In one of the latest general catalogues issued, we find illustrated twenty-three varieties of Pipe Wrenches and Tongs, and the concern that issues this catalogue must know—if they know anything—that the number of GOOD Pipe

See
Page 182.

Wrenches in the market can be counted on the fingers of both hands, and that at least eight of the styles shown are absolutely of no account.

HEADLINES—We have refrained entirely from the use of big, black type and staring headlines. There are so many good things in this book, that if we undertook to emphasize their merits by the use of bold-faced type, the pages would be as black as—.

EXAGGERATIONS—The following "Stock" expressions are taken from the catalogues of different Chuck makers, nearly all of the different manufacturers being represented:

"Best made," "Best for the price,"
 "Nothing better made," "Equal to the best," "Have no equal," "Superior to all others,"
 "Greatest strength,"
 "Stronger than any other," "Simplest and strongest," "Durability and simplicity unequalled."

**Nice
Collection of
Adjectives,
Isn't It?**

If the No. 10 Try Square, Fig. 104, page 29, which is a superior tool of its class, should be described as the *best* Square in the market, where would one find words to describe the Darling, Brown & Sharpe hardened square, Fig. 101?

In our descriptions of the various goods throughout this book, we have carefully refrained from making "inflated" claims as to their merits. We sincerely hope that our frankness in this respect will not prejudice any one against their real quality.

OUR MERCANTILE EXPERIENCE.

We have been engaged in the handling of the classes of goods shown in this book for upwards of twenty-five years. During this time the changes and advancements made have been little short of marvelous. We think we do not exaggerate in saying that twenty-five years ago 80 per cent of the goods shown here were either entirely unknown, or known only as "Specials." In the line of small tools, there might be found in the stores a few sizes of German and English made calipers, Chesterman steel rules, and in fact what would now-a-days be considered almost nothing. Twist drills and drill chucks were just coming to be known; taps, dies and screw plates, in the smaller sizes, were of foreign make; in the larger sizes of the pattern now known as "Blacksmiths' Taps and Dies," made by King & Holroyd, there was absolutely no standard as regards diameters or pitches of thread.

**See
Page 151.**

In Machinery the change is even more marked, Milling and Grinding Machines were practically an unknown quantity, whereas to-day the latter, at least, occupy very nearly the most important place in manufacturing.

In the line of what is technically known as Supplies, there might have been found in a few stores a small assortment of wire in coils, a limited assortment of tool steel, sheet brass, carriage and stove bolts, nuts and washers, etc. There were no mach

ine, set or cap screws; no brass, copper or steel tubing; no brass, iron or steel rods; no spring keys or springs, babbitt metal or solder (every one made his own); no stocks of ready made gears, and so on *ad infinitum*.

To-day we can—we trust with becoming modesty—refer to the contents of this book as evidence of what has come to pass, in the line of changes and improvements.

OUR PRACTICAL EXPERIENCE.

The college-bred engineer is apt to look with disdain upon the shop-educated engineer, while, on the other hand, the shop engineer, educated as he has been by hard knocks and experience, is prone to sniff at what he calls the "Lady Frills" of the other.

In the same spirit, the mechanic or user is apt to consider lightly the dealer's judgment, while the latter, getting net results of the experience of hundreds of customers and users, ought to be credited with having a little knowledge.

We are in a most excellent position as regards opportunities for testing the quality of the goods we sell, as we use in our own shops large quantities of the goods shown in this book. In fact we are safe in saying that three-quarters of the articles shown here, are used either constantly or from time to time in our shops.

A brief summary of the machines we use is as follows:

Two Engines, with Boilers, Pumps,

Heaters, Separators, Steam Heating Apparatus, etc,

One Gas Engine,

One Gasoline Engine,

Four Lighting Dynamos,

Three Electric Motors,

Forty-six Lathes, from 8 to 50 inch swing,

Twelve Drill Presses, from Jewelers' to 34 inch swing,

Four Iron Planers,

Three Iron Shapers,

Eighteen Emery Grinders, comprising the latest forms of Surface and Universal Grinders,

Eleven Universal and Plain Milling Machines,

Three Automatic Gear Cutters,

Besides a great many other tools, such as Power Punches and Shears, Cutting-off and Centering Machines, Gear Testers, a great many machines built especially for our needs, and all the other labor saving machines that we could raise the money to buy.

In the Pattern shop, we have five Saw Tables, a number of Wood Turning Lathes, Scroll Saws, Band Saws, Planers, etc., etc.

It can be easily understood that we have most excellent opportunities for ascertaining the quality of Tools, Machinery and Supplies, by their actual use.

We might repeat what we have said elsewhere, that "our experience is at the service of our customers," and we will always be glad to offer suggestions in regard

Glad to be
Helpful.

to machines, and methods necessary to produce articles of manufacture, at low cost and of superior quality.

TESTIMONIALS.

We have refrained from printing in this book a lot of testimonials. Like most manufacturers and dealers we are apt to get more uncomplimentary than complimentary letters. If anything is wrong, we hear of it pretty quick, and if everything is right, most customers think there is no necessity for advising us of the fact, which is true. However, in the course of a long business experience, we have had a great many flattering letters, and trust we may be excused if we print a portion of a letter received a year or two since.

Gentlemen:—The goods on your invoice have arrived, and we find everything O. K. as usual. We consider it but common justice to add that instances in which we have been prompted to express ourselves as especially well pleased with this or that article, have from their very number prevented our doing so.

Situated as we are in this country, it is not a common occurrence to do hundreds of dollars' worth of business, embracing goods selected from all of your lines, an almost endless variety of articles, and be able to feel that *we have in every instance been thoroughly understood and treated with the same consideration we would have been had we stood at your counter*, but such has been our good fortune.

In short, judging from our experience, *you seem to mean just what you say in the cat-*

**We Mean
Just What
We Say.**

alogues, both in regard to your goods and business methods.

Respectfully yours,

JOHN P. HOSMER.

Fort Huachuca, Ariz.

We don't know Mr. Hosmer personally, but the kindly feeling expressed in his letter made us feel good for many days after its receipt.

As a large portion of our business is with parties with whom we never come in personal contact, it is certainly to our interest that they be inspired with the same confidence which the above letter expresses.

OUR GUARANTEE.

Our guarantee as to the quality of goods sent out is ample and comprehensive. All articles we sell are, in our judgment, the best in their respective classes. A very large proportion of our customers depend on our judgment, and we have a funny notion that when a customer buys goods, he ought to get what he pays for.

Therefore—What we mean by warranting goods is—that if they are not as represented in every particular, they may be returned to us at our expense, and we will replace them with others; or if desired, will refund the price paid. We ask, however, that we be notified always before goods are sent back.

**At Our
Expense.**

TERMS.

To those known to us, and others with well established credit, our terms are thirty days from date of invoice. In all other cases, cash must accompany order.

It is often the case that individuals and small concerns may be perfectly good, and yet have only local credit. In such cases, we have no means of ascertaining their commercial standing, and so must insist that (unless references that are fully satisfactory to us can be given) orders must be accompanied by cash.

Our responsibility and commercial standing can easily be ascertained by referring to commercial agencies, banks, or any large business house.

SHIPPING DIRECTIONS.

In each instance we prefer to have shipping directions accompany the order, and we ship the goods in the manner directed. If, however, no shipping directions are given, we forward by Mail, Registered Mail, Express or Freight, as under the circumstances we think will be most satisfactory to the customer.

C. O. D.

The practice of sending goods C. O. D. (collect on delivery, is—fortunately—growing less common. It entails extra expense both to the buyer and seller, and usually indicates distrust and suspicion. In these days it is not a difficult matter to ascertain the commercial standing of a business house.

To those desiring it, we will be glad to furnish ample evidences of the honesty, integrity, and commercial standing of our house.

Therefore—We will not send goods C. O. D.

GOODS BY MAIL.

The rate of postage on articles sent by mail is one cent per ounce, and no package can be sent weighing over four pounds.

We will be pleased to give the weights of any mailable goods upon application.

Don't send the exact catalogue price on articles and then ask us to send them by mail; we receive hundreds of orders for small articles on which the postage ranges from two cents upwards; these come often from a distance and the postage would be a few cents, when the express charges would be five or ten times as much. We cannot afford to spend the time writing to our customers, asking them to remit us the postage on these goods, and we often have to suffer the loss of these few cents, which on thousands of orders, amounts to considerable; send what you think is right for postage and if there is any over we will return it.

SIZE OF ILLUSTRATIONS.

To the best of our knowledge, but few of the illustrations in this book show exact size of articles described. Dimensions will be furnished upon application.

COMPLAINTS.

We make mistakes, more of them than we like to, and who doesn't? Complaints concerning mistakes or defects in goods should be made at once, and in plain language. Don't be mealy-mouthed about it. We try and take pains to have everything right and satisfactory to our customers, and when it is otherwise, we are more than willing to correct it.

GOODS ON TRIAL.

We do not send our Machines, Tools, or any goods on trial. Everything sold is meant to be just as represented, and if by any chance it should prove otherwise, we are just as anxious to get the goods back and replace with others, or refund the money, as our customers are to have us do so. This may seem a little queer, but it's a fact.

DESTROY FORMER CATALOGUES.

In issuing this catalogue, we cancel all prices and lists given in previous catalogues. Any and all discounts heretofore quoted from list prices in former catalogues are cancelled.

All prices and discounts are subject to change without notice.

SUBSTITUTION.

We seldom substitute other articles for those ordered. There are times when, in our judgment, it seems best to do this. If for any

reason, we send other goods than those called for, it is distinctly understood that the change or substitution is *at our own risk*, and that we will pay all expense of changing if the goods thus substituted are not satisfactory.

SAME AS LAST.

Please do not order goods "Same as last." In fact, as far as possible, reference to former letters or orders should be avoided. We receive so many, that compliance with a request of this kind involves much trouble and loss of time. Every letter should be explicit and complete in itself.

Itemize and specify articles as clearly and distinctly as possible. Orders are sometimes delayed for days, because customers fail to plainly specify what they want. It also assists us greatly in getting out orders, if a plain, straight list of the goods wanted accompanies orders. We receive many orders in which customers name two or three items wanted, then ask a question or two, then a few more items, and then questions, and so on.

OUR BEST ADVERTISEMENT.

There are a great many different ways of advertising, but our very best advertisement is a well pleased and satisfied customer. Some ancient writer has said that "Kind words can never die." What you may be able to say for us will be most heartily appreciated.

LABOR-SAVING TOOLS.

In the December (1894) number of "Machinery," is an interesting article by Jas. Hartness, entitled "Points about Turret Lathes," from which we quote as follows:

"The present condition of the market has brought the question of Labor-saving Machinery to the front with greater prominence than ever before. The cost of production must come down, and Labor-saving Machinery seems to offer the most effective means.

Wage-cutting seldom cuts the cost in the machine shops; if it does, it only amounts to a reduction of from 10 to 20 per cent, while Labor-saving machinery often cuts the cost of the labor from 75 to 80 per cent. * * * *

I have yet to learn, however, of the first case where the turret machine has thrown men out of employment, but I know of many instances where shops have been able to secure work when using the turret machine, that otherwise could not have been taken. Good wages cannot be paid to men using inferior implements. Orders cannot be taken by companies so equipped, without they are satisfied with small profits and poorly paid workmen."

Labor-Saving, and Money-Making are synonymous.

The use of a simple thing like the Metal Worker's Crayon (Fig. 1440), costing 2 cents, as compared with the use of chalk and similar substances, especially on hot iron, will often save \$25.

The Tool Grinder (Fig. 901) *does* seem like an expensive machine as compared with the ordinary Grindstone outfit, but a man can go to it, grind a tool *properly*, and get back to the machine they are operating, in less than a minute (fact).

This is what Chordal says about his grindstones:

* * * "They were most always out of true; men put off grinding tools as long as possible, worked with dull tools, and, of course, did poor work and wasted lots of time. Let a man be working on a nice lathe job, the tool gets dull; he thinks of the awful grindstone, postpones grinding till he gets real mad, then does it, and gets nervous and unfit for the work in hand." * * *

Most Grindstone Rigs are in the above described condition, and it does not require fine figuring to establish the fact that the Tool Grinder referred to is a Labor-Saving and Money-Making machine.

The Hawley Down-Draft Furnace for steam boilers is rather an expensive device, Its object is to produce perfect combustion, thus saving fuel, and preventing smoke. The company will, in the majority of cases, agree to put in these Furnaces and take as their pay the amount saved in the consumption of fuel—over the ordinary method—in six months to a year. They have had remarkable success, but there are a great many more concerns not using, than there are using them.

At one time we had an idea of going through this book and making up a special list of Labor-Saving Machinery, Tools, and Supplies, but we found it too much of a job, as it would practically mean making up another book the same size as this. We will have to content ourselves with leaving the selection of such goods to the judgment of our readers, and trust they will give the matter more than a passing thought.

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QUALITY! PRICES! SERVICE!

In purchasing goods, there are three important things to consider,—quality, prices, and service. The first should be High, the second Low, and the third Good—at least that would be an ideal way to have it; but what is ideal, is not always practicable. We get so used to seeing advertisements like this—

“Highest Quality,”

“Lowest Prices,”

“Best Service,”

that it sometimes seems as if it were quite an easy matter to fulfill the requirements called for by such statements, but it isn't.

QUALITY.

In nearly all cases, the question of Quality is an important one. People are apt to confound Quality with Grade or Class; we do, ourselves, oftentimes. Let us illustrate with an article outside of our line:

Java coffees are high Grade, Maracaibo, medium Grade, and Rio and Santos, low Grade, but there are several Qualities in each Grade; and one must pay 35 to 40 cents a pound for the highest Quality Java, while an inferior Quality may be bought for 25 cents.

If such a thing were possible, we would like to handle nothing but the highest Grade goods, but in a general line this is impossible. There must be variety, to accord with customers' requirements and their means.

All goods we handle are of the highest Quality we can obtain in the

various lines. If a medium Grade machine, it will be the best machine that we know of, in its class. If a low Grade babbitt metal, it will be the best low Grade metal we can obtain.

We never, knowingly, misrepresent Grades or Qualities.

PRICES.

The question of prices is always an important one. Many dealers dispose of this question very easily, by simply making the statement, “Our Prices are always the lowest.”

It is rather an unpleasant subject to tackle. If—especially after what we have said in the foregoing article about quality—we should say that our prices are always the lowest, any intelligent person over eight years of age, would suspect—with good reason—that we were lying. On the other hand, if we should say that our Prices were the highest, and people believed us, what sort of an advertisement would that be for us?

We, therefore, content ourselves by simply stating that, quality considered, we believe our prices will compare favorably with those of other houses.

GOOD SERVICE.

In all cases, the question of Good Service is a most important one, and we sometimes think it is harder to attain, than either high Quality or low Prices. Good Service with us means a great deal; among other things, it means careful attention, promptness, and helpfulness.



FITNESS.

It might be supposed, that the above cuts are shown as horrible examples of how badly tools may be maltreated. We might say quite a bit in this direction, taking as our text, "The Abuse of Tools." But at present our purpose is to consider another question, that of **FITNESS or ADAPTABILITY.**

The illustrations represent a No. 1 Almond and a No. 3 Beach drill chuck (see page 97), that had been used—or rather mis-used—in the machine shop connected with a large manufacturing establishment. Their appearance indicates that the drill was tightened by using a hammer on the chuck, and loosened with a cold chisel and hammer, with the occasional assistance of a pipe wrench. This is serious—not a joke.

These chucks—particularly the Beach—are the finest and highest quality goods that are produced, and are especially intended for use where accurate results are desired; but are not necessarily intended for delicate

work, as they are very strong. The work for which these chucks were required was common, rough drilling: flat drills were used, the shanks being left rough, and they were operated by cheap help, mostly boys.

We have sold the company from whom these were obtained, during the past fifteen years, perhaps thirty of these chucks without knowing what kind of work they were used on. Had we known this and the class of mechanics (?) who used them, we would certainly have suggested the use of Chucks such as are shown on pages 94 and 95, in which the opportunities for abuse are not so great, hammers, cold chisels and wrenches, not being available for tightening. Almost the only way of spoiling this chuck, would be to "bung up" the socket where key enters.

There are many instances in which medium, and even low grade articles answer the desired purpose very well. Let us give a few examples:

EXAMPLE I.

The Crescent drill rod (page 433) is a very high grade tool steel, but a cold chisel made of this steel wouldn't be a particle better than one made of a good, ordinary quality tool steel, costing one-third as much, and would certainly be much more inconvenient to handle than one made of octagon steel.

EXAMPLE II.

Where large quantities of bolts and nuts are to be threaded, the machine shown on page 159 will save over ordinary methods—in some in-

stances—its cost in a year. Yet, for general shop use, where small quantities of a size, and a large variety of sizes are required, the Bolt Cutters shown on page 158, at one-third to one-half the price of the others, are really more desirable.

EXAMPLE III.

The 700 Vim Cylinder Oil, described on page 303, is moderate in price and of fair quality. For use in the cylinders of Westinghouse engines, we believe this oil has absolutely no superior, at *any price*.

EXAMPLE IV, BABBITT METAL.

One reason for the apparent success in the use of many of the largely advertised fancy brand Babbitt Metals, lies in the fact, that one-half of the purposes for which Babbitt Metal is used, is on machines running at comparatively slow speeds and at light pressure; and an anti-friction metal composed almost entirely of lead, would answer very well.

We conclude this side of the question with an article from the "American Machinist" of recent date.

"Generally speaking, in the instance of machines, the one with which the most work can be produced in a given time, is the cheapest, notwithstanding the cost. But this does not always follow. Suppose there is no use for such a tool for more than a month in the year, the case requires further consideration. You do not need a horse that can do his mile in two minutes to draw a plow. A cheaper animal would probably be better in every way."

THE OTHER SIDE.

While we are at it, it may be well to consider the opposite side and present a few examples in this direction.

EXAMPLE I.

In selecting emery wheels, the best are none to good. An emery wheel is used to grind away stock, and the wheel that will take off the greatest amount of material in the least time, is the most economical to use, even though it may cost more. The wheel that lasts the longest is not always the cheapest in the end.

EXAMPLE II.

Steam valves of low grade and inferior quality are always the most expensive in the long run. If they leak, they are the cause of waste, annoyance and expense. If used constantly they are short-lived, and in a great many cases the cost of replacing a valve is considerably more than the cost of the valve itself.

These remarks will apply very well to all Steam goods.

EXAMPLE III.

The Sensitive type of drilling machines, such as are shown in Figs. 434, and 443, are considerably higher in price than the blacksmith drills. But where the object is to drill large numbers of small holes, say $\frac{1}{8}$ and under, the use of one of these drills will result in a great saving of time and cost of drills.

A customer to whom we recently sold a Sensitive drill, assured us the other day, that by the use of this drill he was saving upwards of \$2.00

per day, by reason of increased production. At this rate, it wouldn't take very long to pay for the machine.

EXAMPLE IV.

The Triplex and Harrington chain hoists, Figs. 1461 and 1462, are considerably higher in price than either the rope blocks, or different hoists; but as one man unassisted, can hoist from three to six times as much as with the others, it stands to reason there are a great many cases in which the use of these hoists will be found a matter of considerable economy.

HOW IS ONE TO KNOW?

At least one-half (perhaps more) of the business in the lines represented in this book, is done through the mediums of catalogues and correspondence.

In studying up trade catalogues, one is apt to be deceived by the numerous statements made relative to the quality of tools.

We copy here, selections from the catalogues of six different manufacturers of tools, which represent claims made for the entire line of tools manufactured by each. In making these selections, we did not pick out the firms at random, but after the most careful consideration.

For obvious reasons, we do not print the names of these concerns. They are in number, six; three of them are the leading manufacturers of high grade machinery in this country, and have a reputation that is world-wide. The other three are quite well known as makers of tools

that are low in price, and, compared with the foregoing, low in quality.

SELECTION 1.—“We positively guarantee every machine to be fine and perfect, accurate and true, and made of best materials.”

SELECTION 2.—“Careful attention is given to insure the best quality and workmanship, and in points of design, power, strength, and convenience in handling, they will be found all that is desirable.”

SELECTION 3.—“We use the best quality of stock, the workmanship is unexcelled, and the wearing qualities are the best throughout. Truth and accuracy are guaranteed.”

SELECTION 4.—“The machines and tools described here are made with the intention that they shall be the best in their respective classes.”

SELECTION 5.—“Our tools are of modern design, with all the latest improvements, being unequalled for proportions, workmanship and accuracy, as well as durability.”

SELECTION 6.—“Our tools are strong and durable, simple in design, and accurately constructed.”

It would be difficult for any one after reading the above, to determine which of these firms make the high grade and which the low grade.

It is not our purpose to give the secret away, excepting to say that the three selections most modest in tone are put forth by the manufacturers whose goods are the best. How is one to know?

OUR ASSISTANCE.

We have in a number of places throughout this book, stated our

willingness to be of service to our customers and would-be customers. Our efforts in this direction are often hindered by reason of the meagre details furnished us. Of course it is easy for us to advise in a general way, but we cannot always know the conditions that obtain, with different users, and this in many cases has everything to do with the proper selection of a tool or machine.

If you know all about it, there is no need of asking us; but if you don't, and want us to try and help you, why, tell enough to enable us to judge intelligently.

FOOL ORDERS.

We know of no more fitting term than the above to apply to a certain class of orders. The following order was received by us a few days ago:—

"Send me at once $\frac{1}{2}$ gross screws, about $\frac{1}{4}$ diam. x $\frac{1}{2}$ long. Send them by express C. O. D."

It is not stated whether they are to be wood screws or machine screws; whether iron or brass, flat, round or fillister head. The price in any case would not be more than 25 cents, and the postage 5 cents; if sent by express the cost of expressage and returning the money would be 40 cents.

Here's another:

"Several years ago we bought of you some chain links. Please send us at once enough for a boy's safety. Send the chain in one piece. Give us the best discount, better than before, for this is a larger lot."

After two or three letters had passed between us, we found that 3 $\frac{1}{2}$

ft. of No. 25 link belt at 10 cents per ft. was the article wanted.

SPECIAL GOODS.

The following is from the "American Machinist:":

"There is a point too often overlooked in designing any new machinery or appliances, and this is, in having a list of commercial sizes and prices at hand, of anything like screws, taps, bar iron, steel, or numerous other portions which can so often be bought much cheaper than we can make them, if we only prepare for it in the design, and we can save more than we think in this manner. It is no disgrace to the tool maker, that he cannot make individual taps of odd sizes as cheaply as regular sizes can be bought, when made in quantities on special machinery.

This can be carried into nearly every department, and should be looked after as strictly as possible, as special forms and sizes of bolts and similar parts are much more expensive, and can very often be avoided."

To the above we might add, that if it is absolutely necessary to use goods that are special or uncommon, be sure and allow plenty of time to get them in, and remember that special goods are nearly always more expensive than regular stocks.

REPUTATION.

We hear a great deal of foolish talk about this or that concern charging exorbitant prices on account of their reputation. There

may be an occasional case of this kind, but we firmly believe it is only occasional.

It will almost invariably be found, it is not reputation, but real quality that is being charged for.

Such concerns as Peter Cooper, Brown & Sharpe, Henry Disston, Oliver Ames, Morse Twist Drill Co., et al, got their reputation by always making the best goods. We believe that if any one else made as good a Shovel as Ames, the public would have found it out long ago, and the Ames Co. would not be able to sell

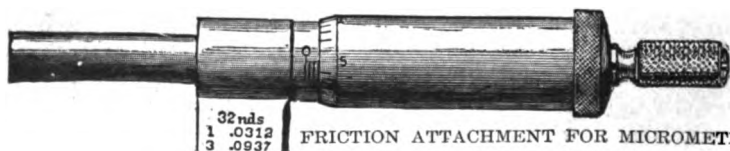
five shovels to any one else's one, and get an extra price for reputation.

INSURANCE.

We have before us two letters just received; one from Maryland, one from Illinois. Both state that the writers have lost their tools by fire, and no insurance. Not one mechanic in five hundred insures his tools against fire. The cost of insurance is—in most cases—a very small item compared with the loss of the tools. Only a very rich man can afford to go without insurance.

Consult an insurance agent.

MICROMETER CALIPERS.



We are prepared to furnish any of the Micrometer Calipers shown on pages 5 to 8, with Friction Attachment, at an added price of 50 cents. By means of the small knurled end of spindle, the spindle may be operated much more quickly. When used carefully, it enables the objects measured to be subjected to about the same degree of pressure. It is convenient where a number of measurements have to be quickly taken, or where a caliper is in comparatively unskilled hands.

We do not believe it is possible to obtain as accurate measurements as with the ordinary manner of using a micrometer, in skilled hands. Micrometers with the Friction Attachment may be adjusted to compensate for the wear.

We mention a No. 2 Caliper in the following column, but do not price same. It is the same size and price as the No. 4 (see Fig. 1), but has bevel measuring surfaces, as shown in Fig. 4.

MICROMETER CALIPERS.

It is but a few years since Micrometer Calipers were considered a curiosity. Mechanics looked with surprise at the little arrangement that would measure a thousandth part of an inch. There are still some who seem to consider it a complicated instrument, whereas it is absurdly simple, and any boy of ordinary intelligence can be taught to use one in a few moments, in fact, four-fifths of the apprentice boys in our shops are using them.

A thousandth part of an inch can be as easily read as a sixteenth, and a quarter-thousandth as a sixty-fourth on a rule. There have been some very useful improvements made in these tools, the most important being the stamping of decimal equivalents on the frame; a Vernier, by which ten-thousandths are obtained; a Covered Screw, protecting it from dust and grit; and a Clamp Screw, which holds the spindle at any point of measurement.

Brown & Sharpe make thirty odd styles of Micrometer Calipers. Those shown and described comprise the leading and most desirable forms. We can furnish any of the other makes of Micrometer Calipers on the market, but we believe from experience, that up to the present time Brown & Sharpe are the only makers who have demonstrated that they can furnish a practically perfect tool. As at present made, their range is limited, two inches being the largest size in general use. We believe that in the near future they will be supplied at moderate cost, with capacity of four or even six inches, made perhaps on principle similar to that shown in Fig. 6.*

Can furnish nearly all styles with the Metric system, if so desired. Prices are the same. When so graduated, the table decimal equivalents is omitted.

In order to aid our customers in making a selection, we beg leave to suggest that the following numbers selected from this list, represent the most saleable and desirable styles.

In the $\frac{1}{4}$ in. size. Nos. 2 and 4; in the 1 in. size, Nos. 15, 19, 20 and 22; in the 2 in. size, Nos. 30 and 38.

Notwithstanding the great variety offered and described, we are safe in

saying that 90 per cent of our sales are embraced in the above numbers.

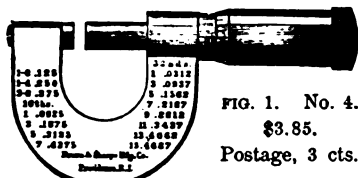


FIG. 1. No. 4.

\$3.85.

Postage, 3 cts.

This Caliper measures all sizes less than $\frac{1}{4}$ in. by thousandths of an inch.

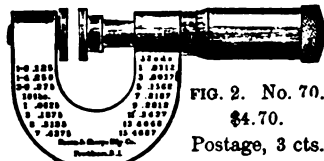


FIG. 2. No. 70.

\$4.70.

Postage, 3 cts.

Fig. 2 shows a caliper with large measuring surfaces ($\frac{1}{4}$ in. diam.) designed for measuring the thickness of paper, cardboard, cloth, or any yielding substance. The large surfaces have less tendency to compress the object; it will be found invaluable to paper manufacturers and dealers.

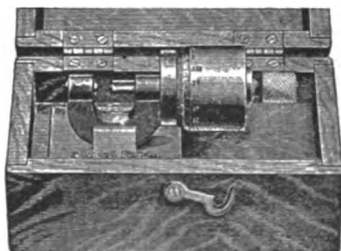


FIG. 3. No. 75.

Price, in Cherry case, \$

This Caliper measures all sizes less than $\frac{1}{4}$ in. by ten-thousandths of an inch. The measurements can be read directly from the barrel. The screw has fifty threads, and the barrel is divided into two hundred equal parts.

It will be found of service to wire drawers, watch-makers, and others who desire fine measurements.

We furnish neat Morocco, velvet-lined cases for micrometers, at following prices: $\frac{1}{4}$ inch, \$0.45; 1 inch, \$0.65; 2 inch, \$0.90

* Since the above was written, Caliper No. 60, Fig. 5, has been brought out.

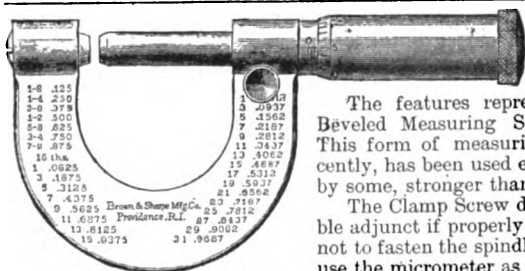


FIG. 4. No. 17.

Price, \$4.70.

The features represented in Fig. 4 are the Beveled Measuring Surfaces and Clamp Screw. This form of measuring surfaces, until quite recently, has been used exclusively, and is considered by some, stronger than the square.

The Clamp Screw device will be found a valuable adjunct if properly used. The object of this is, not to fasten the spindle at a certain point and then use the micrometer as common calipers, but simply

to secure the spindle so that it can be laid down without changing the point of measurement, and it should be used for this purpose only.

FIG. 5. No. 20.

Price, \$5.10.

The features here are the Square Measuring surfaces and Vernier device, for reading to ten-thousandths of an inch. The outer end of the frame is the same size as the Gauge Screw spindle, and the edges of the Measuring Surfaces are not beveled, but are left square. It is more convenient for measuring certain classes of work; it will gauge under a shoulder, or measure a small projection on a plane surface. Tool makers will especially appreciate Micrometers of this form.

The readings in ten-thousandths of an inch are obtained by means of a Vernier, or series of divisions, on the barrel of caliper, as shown in cut.

Calipers graduated to ten-thousandths should not commonly be used where fine measurements are not required, as in an instrument of this class a wear is perceptible and important, which would be of comparatively slight consequence in a caliper that reads only to thousandths.

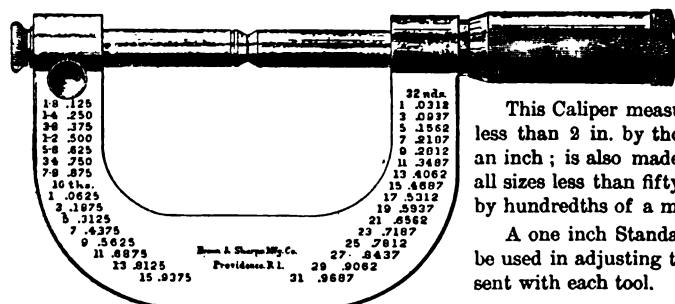
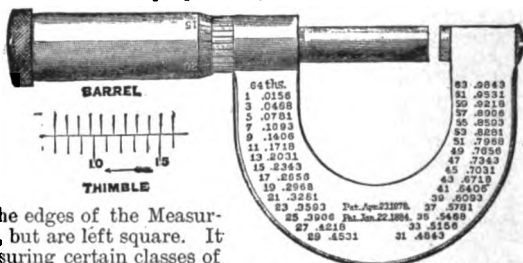


FIG. 6.

No. 30.

Price, \$6.80

This Caliper measures all sizes less than 2 in. by thousandths of an inch; is also made to measure all sizes less than fifty millimetres by hundredths of a millimetre.

A one inch Standard Gauge to be used in adjusting the caliper, is sent with each tool.

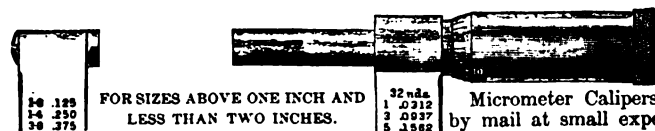


FIG. 7.

No. 38.

Price, \$5.10.

FOR SIZES ABOVE ONE INCH AND
LESS THAN TWO INCHES.

Micrometer Calipers can be sent
by mail at small expense.

No.	Capacity.	Graduated to read to	Style of
No. 5, \$4.70	$\frac{1}{2}$ in.	ten-thousandths	Fig. 1, (Page 5), without Clamp Screw.
" 15, 4.25	1 "	"	" 4, " 6, " " "
" 16, 5.10	1 "	ten-	" 4, " 6, " " "
" 19, 4.25	1 "	"	" 5, " 6, " " "
" 21, 5.55	1 "	ten-	" 5, " 6, " with " "
" 22, 4.70	1 "	"	" 5, " 6, " " "
" 31, 7.25	0 to 2 in.	"	" 6, " 6, " " "
" 32, 7.65	0 " 2 "	ten-	" 6, " 6, " without " "
" 33, 8.10	0 " 2 "	ten-	" 6, " 6, " with " "
" 34, 5.55	1 " 2 "	"	" 6, " 6, " " "
" 35, 5.10	1 " 2 "	"	" 7, " 6, " without " "
" 39, 5.55	1 " 2 "	"	" 7, " 6, " with " "
" 41, 6.40	1 " 2 "	ten-	" 7, " 6, " " "

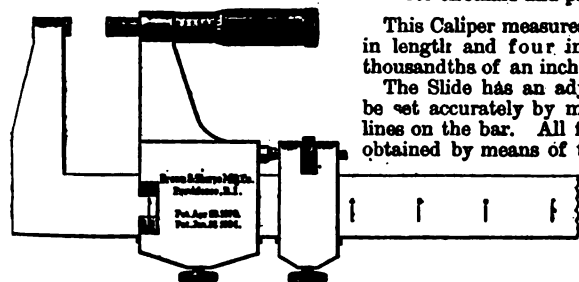
A one-inch Standard Gauge, to be used in adjusting Caliper, is sent with each of the two-inch capacity Calipers.

No. 670 is a Gear Tooth Caliper, used for accurately measuring the distance from top (or face of tooth) to pitch line; also, the thickness of tooth at pitch line.

Shops doing their own gear cutting, will find it to their advantage to have one of these tools.

No. 500 is a Screw Thread Caliper for measuring the depth of thread of screws, and is used in the manufacture of Taps.

Nos. 670 and 500 are new tools. Write for circulars and prices.



This Caliper measures all sizes to six inches in length and four inches in diameter, by thousandths of an inch.

The Slide has an adjusting screw and can be set accurately by means of the graduated lines on the bar. All fractions of inches are obtained by means of the micrometer screw.

FIG. 8. No. 60.
BEAM MICROMETER
CALIPER.

No. 64, similar to Fig. 8, measures all sizes to twelve inches in length and six inches in diameter by thousandths of an inch.

Prices on the Micrometer Calipers, Nos. 60 and 64, will be furnished on application.

METRIC EQUIVALENTS.

$\frac{1}{16}$ mm. = .000984 inches.	10 cm. = 1 Decimeter = 3.937 inches.
10 mm. = 1 Centimeter = 0.3937 inches.	10 dm. = 1 Meter = 39.37 "
25.4 mm. = 1 English inch.	

mm = In.	mm = In.	mm = In.	mm = In.	mm = In.	mm = In.
$\frac{1}{16}$ = .0008	$\frac{1}{16}$ = .0095	$\frac{1}{16}$ = .0197	$\frac{1}{16}$ = .0299	$\frac{1}{16}$ = .0386	11 = .4331
$\frac{1}{8}$ = .0016	$\frac{1}{8}$ = .0102	$\frac{1}{8}$ = .0213	$\frac{1}{8}$ = .0307	1 = .0394	13 = .5118
$\frac{3}{16}$ = .0024	$\frac{3}{16}$ = .0110	$\frac{3}{16}$ = .0228	$\frac{3}{16}$ = .0315	2 = .0787	15 = .5906
$\frac{1}{4}$ = .0032	$\frac{1}{4}$ = .0118	$\frac{1}{4}$ = .0236	$\frac{1}{4}$ = .0323	3 = .1181	16 = .6299
$\frac{5}{16}$ = .0039	$\frac{5}{16}$ = .0126	$\frac{5}{16}$ = .0244	$\frac{5}{16}$ = .0331	4 = .1675	17 = .6693
$\frac{3}{8}$ = .0047	$\frac{3}{8}$ = .0134	$\frac{3}{8}$ = .0252	$\frac{3}{8}$ = .0339	5 = .1969	19 = .7480
$\frac{7}{16}$ = .0055	$\frac{7}{16}$ = .0142	$\frac{7}{16}$ = .0260	$\frac{7}{16}$ = .0347	6 = .2362	21 = .8268
$\frac{1}{2}$ = .0063	$\frac{1}{2}$ = .0150	$\frac{1}{2}$ = .0268	$\frac{1}{2}$ = .0354	7 = .2760	23 = .9055
$\frac{9}{16}$ = .0071	$\frac{9}{16}$ = .0158	$\frac{9}{16}$ = .0276	$\frac{9}{16}$ = .0362	8 = .3150	24 = .9449
$\frac{5}{8}$ = .0079	$\frac{5}{8}$ = .0165	$\frac{5}{8}$ = .0284	$\frac{5}{8}$ = .0370	9 = .3543	25 = .9843
$\frac{11}{16}$ = .0087	$\frac{11}{16}$ = .0181	$\frac{11}{16}$ = .0291	$\frac{11}{16}$ = .0378	10 = .3937	26 = 1.0236

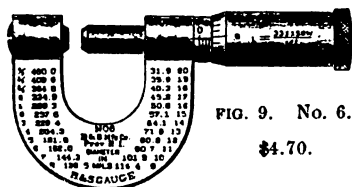


FIG. 9. No. 6.

\$4.70.

This Caliper is especially arranged for Electricians and all users of wire for electrical purposes; measures all sizes to 0000, B. & S. Gauge, by tenths of Mils. The equivalents, expressed in Mils, of the different sizes of wire from 0000 to 20, B. & S. Gauge, are stamped on one side of the frame, and the circular Mils of the same sizes on the other.

Three formulas are stamped on the thimble: one for weight, length in feet and diameter being known; one for length in feet, weight and diameter being known; and one for resistance in Ohms per hundred feet at 75° F., length and diameter being known.

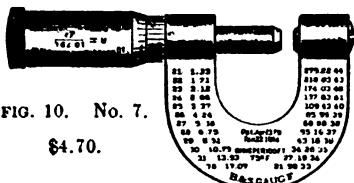


FIG. 10. No. 7.

\$4.70.

The No. 7 Caliper only differs from No. 6, in that the equivalents, stamped on one side of the frame, are for wire from 21 to 44, B. & S. Gauge, and on the other side, the resistance in Ohms per hundred feet at 75° F., of the same sizes. Postage on Figs. 9 and 10, three cents each.

VERNIER CALIPER.

While the Vernier Caliper has, in a large measure, given way to the less expensive and more generally useful Micrometer Caliper, it is still the only instrument suitable for making delicate measurements above two inches that can be furnished at a moderate price.

Jas. A. Taylor & Co. and the Pratt and Whitney Co. both make measuring machines of twelve inch capacity; the

one measuring within one ten thousandth, the other perhaps one-fortieth of one thousandth. The price of the first machine is \$102, and of the other \$375, and both of them are rather out of the reach of ordinary "every day" folks.

Fig. 11 is a fac-simile of one side of the Vernier Caliper, which reads to thousandths of an inch. The other side is graduated to sixty-fourths of an inch, and is arranged for taking inside measurements; also has points to transfer the distance with dividers. We can furnish Calipers divided to read to fiftieths of a millimetre, in place of sixty-fourths of an inch, when so desired.

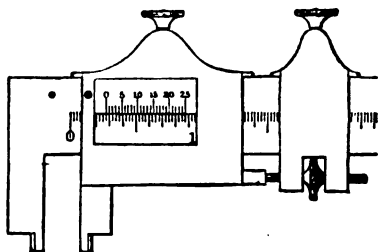


FIG. 11. FRONT VIEW.

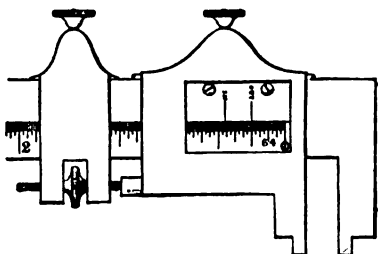


FIG. 12. BACK VIEW.

Size.	Price in Morocco Case.	Length of Jaw.	Width of Jaw—closed.
4 in.	\$9.45	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.
6 "	13.50	$1\frac{1}{4}$ "	$\frac{1}{2}$ "
12 "	18.00	$1\frac{1}{2}$ "	$\frac{3}{8}$ "
12 "	22.50	$2\frac{1}{4}$ "	$\frac{3}{8}$ "
24 "	22.50	$1\frac{1}{2}$ "	$\frac{3}{8}$ "

Can be furnished with Metric System. We can furnish a Height, also a Depth Gauge, made on the same principle.

Cuts and descriptions sent upon application.

DESCRIPTION OF THE VERNIER, AND ITS USE.

On the bar of the instrument is a line of inches, numbered 0, 1, 2, etc., each inch being divided into ten parts, each tenth into four parts, making forty divisions to the inch. On the sliding jaw is a line of division (called a Vernier, from the inventor's name) of twenty-five parts, numbered 0, 5, 10, 15, 20, 25. The twenty-five parts on the Vernier correspond, in extreme length, with twenty-four parts, or twenty-four fortieths on the bar; consequently each division on the Vernier is smaller than each division on the bar. If the sliding jaw of the Caliper is pushed up to the other jaw, so that the line marked 0 on the Vernier, corresponds with that marked 0 on the bar, then the two next lines to the right will differ from each other by one-thousandth of an inch, and so the difference will continue to increase one-thousandth of an inch for each division, till they again correspond at the line marked 25 on the Vernier.

To read the distance the Caliper may be open, commence by noticing how many inches, tenths and parts of tenths, the zero point on the Vernier has been moved from the zero point on the bar. Now count upon the Vernier the number of divisions, until one is found which coincides with one on the bar, which will be the number of thousandths to be added to the distance to be read on the bar. The best way of expressing the value of the divisions on the bar, is to call the tenths one-hundred-thousandths (.100), and the fourths of tenths, or fortieths, twenty-five thousandths (.025). Referring to Fig. 11, it will be seen that the jaw is opened two-tenths and three-quarters, which is equal to two-hundred and seventy-five thousandths (.275).

Now suppose the Vernier was moved to the right so that the tenth division should coincide with the next one on the scale, which will make ten-thousandths (.010) more to be added to two-hundred and seventy-five thousandths (.275), making the jaw open two-hundred and eighty-five thousandths (.285).

In making inside measurements with the 6 inch Vernier Caliper, two and one-half tenths or two hundred and fifty thousandths (.250) of an inch should be

added to the apparent reading for the space occupied by the caliper points.

With the 12 and 24 inch Vernier Calipers, three-tenths or three-hundred-thousandths (.300) should be added.

When the other side of the instrument is used, no deduction is necessary, as there are two lines, one indicating inside and the other outside measurement.

CALIPER SQUARES.

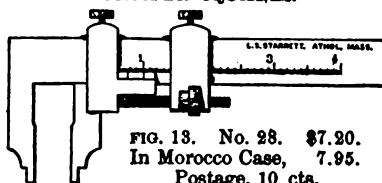
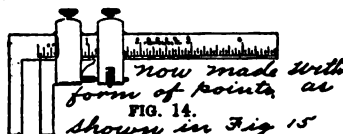


FIG. 13. No. 28. \$7.20.
In Morocco Case, 7.95.
Postage, 10 cts.

Fig. 13 shows a Caliper-Square with Micrometer Adjustment by which thousandths of an inch can be obtained, for both inside and outside measurements.

The jaws are 1½ inches long, hardened, and open four inches.



The Caliper-Square, shown in Fig. 14, is of Darling, Brown & Sharpe's make, and is so widely known that any further description is needless. The beam is divided into 64ths of an inch on one side and 100ths on the other. The six and nine inch sizes have hardened jaws.

Size.	Length of Jaws.	Without Adj. Screw.	With Adj. Screw
2 in.	½ in.	\$2.05	\$3.15
4 "	1 ½ "	3.15	4.05
6 "	2 "	4.95	6.75
9 "	3 ½ "	8.10	9.20

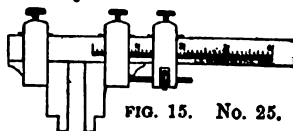


FIG. 15. No. 25.

4 inch, without adjustment, \$2.95,
4 " with " 3.60.

With hardened jaws, \$1.50 extra.

Postage on Figs. 14 and 15: 3 in., 3c. a
4 in., 5c.; 6 in., 8c.; 9 in., 12c.

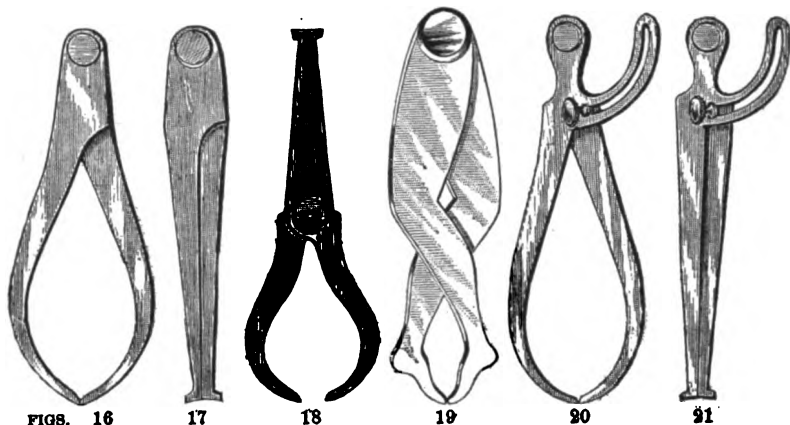
CALIPERS.

Calipers shown in Figs. 16 to 21 inclusive, are of ordinary Friction-Joint type. They are well made, nicely finished, and the best of their class.

Figs. 16 and 17 are regular outside and inside Calipers.

Figs. 18 and 19 are both outside and inside Calipers.

Figs. 20 and 21 are provided with quadrant and knurled thumb screw, so that they may be set at any point.



		Sizes:	2"	3"	4"	5"	6"	8"	10"	12"	15"	18"	21"	24"
Figs. 16 and 17	Price,	\$0.18	.20	.25	.28	.30	.40	.50	.60	1.25	1.50	1.75	2.00	
" 18	"		.25	.35	.45	.50								
" 19	"		.25	.30	.40									
" 20 and 21	"		.40	.45	.50	.65								
	Postage,	.01	.01	.03	.03	.03	.04	.07	.10					

Fig. 22 illustrates a strong, heavy Caliper, having an adjustment. It is a first-class tool, and is especially useful to Pattern-makers (wood), or the Machinist doing heavy work where measurements have not to be very accurate.



FIG. 22.

		Postage.	
6 in.	\$0.60	2 cts.	
8 "	0.75	9 "	
10 "	0.90	12 "	
12 "	1.15		
15 "	1.75		
18 "	2.50		

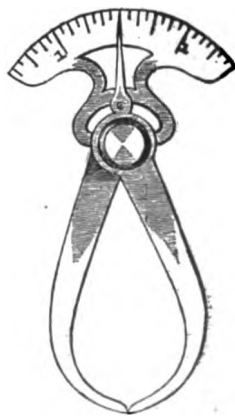


FIG. 23.

The Register Caliper shown in Fig. 23 will be found very convenient for pocket use, as approximate measurements are indicated on the quadrant.

		Postage.	
3 in.	\$0.50	2 cts.	
4 "	.60	3 "	
5 "	.75	4 "	
6 "	.90	5 "	

WELLES' IMPROVED FIRM-JOINT CALIPERS.

Figs. 24 and 25 take the place with us of Steven's "Firm Joint" Calipers, shown in our former catalogues. It excels greatly any caliper heretofore made; is not only considerably lighter—a great advantage, from the fact that in delicate measurements its weight will not force it over the work—but is stronger as well; this by reason of quality of stock and workmanship. The joints are perfectly ground and fitted, and will not loosen.

These Calipers have points of excellence that are not found in any others on the market; the design, proportion and manner of construction being based on experience in the use of calipers.

The Calipers shown in Figs. 26 and 27, while possessing all the good points of a well made, firm-joint caliper, have in addition an adjustment by means of a screw, which is convenient and positive. The device consists of a flat plate or washer placed between legs of caliper, so that the friction which holds legs in place is not directly between the inside surface of the legs, but each leg meets with its frictional resistance in moving on the plate or washer. This plate is extended down leg as shown, the end of which is formed in a nut, into which the adjusting screw works. The screw is affixed to one leg by a stud, so that in turning it the plate is moved in or out, and by friction carries the other leg with it, and thus adjusts the caliper.

It will be seen that by this construction the caliper can be adjusted in whole or in part by the ordinary method, without having to stop to loosen or tighten anything, and that one adjustment in no way interferes with the other.

The Outside Calipers are rated by the circle or diameter of shaft they will caliper; the Insides by the length of legs.

Mechanics skilled in fitting with calipers will find it to their interest to give the Adjustable Calipers a trial.



FIG. 24.



FIG. 25.

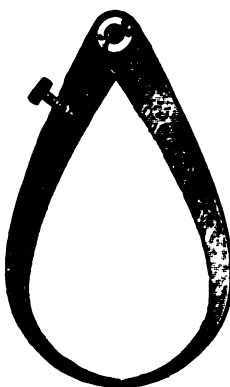


FIG. 26.



FIG. 27.

Sizes :	5 in.	8 in.	12 in.	18 in.	24 in.
Plain,	\$0.60	0.80	1.00	1.75	2.40
Adjustable, . . .	1.00	1.40	1.70	2.25	3.00
Postage, . . .	.03	.05	.10		



FIG. 28.



FIG. 29.

Hermaphrodite Calipers are necessary and useful. In Figs. 28 and 29 we show them in an improved form, both plain and adjustable.

Size.	Plain.	Adjustable.	Postage.
5 in.	\$0.60	\$1.00	3 cts.
8 "	.50	1.40	5 "



FIG. 30.

Pond's Improved Calipers (Figs. 30 and 32) are old favorites.

These Calipers have a quick adjustment, consisting of a Nut (see Fig. 33) in one solid piece, which, under pressure from the spring engages the screw. When pressure is released, the nut slides freely over the screw. The price has

recently been lowered considerably. We recommend them as being most excellent tools.

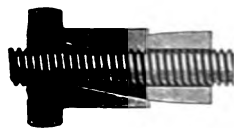


FIG. 33.



FIG. 32.

PRICES OF POND'S CALIPERS.

Size.	Price.	Postage.
4 in., \$0.80 either outside or inside.	3 cts.	
5 " 0.85 " " "	4 "	
6 " 0.90 " " "	5 "	
8 " 1.00 " " "	7 "	

Fig. 31 shows what is known as a Keyhole Caliper. Its uses are varied; is most commonly used, however, for determining the depths of key-ways cut in hubs of pulleys and in shafts.

Size.	Price.	Postage.
3 in.,	\$0.60	2 cts.
4 "	0.65	3 "

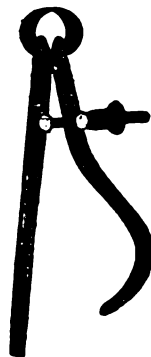
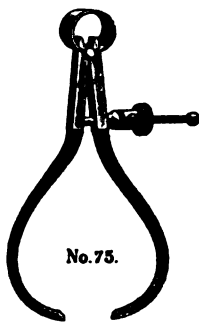


FIG. 31.

TORN CATALOGUES.—Every article in this catalogue is very plainly described, either by figure, number, regular number, or name; and we beg our customers not to cut or tear out pages, or parts of pages, as this mutilates the book, and when done to any extent, destroys it for reference.

STARRETT'S "FAY" AND "YANKEE" CALIPERS.

These tools are made on scientific principles, the spring being so applied that a firm joint is always maintained, and an even tension of the legs secured when opened to their full extent, as well as when closed; and as the arms are stiff, the most reliable spring-bow caliper or divider of practical weight that can be made, is secured.



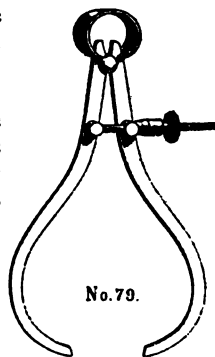
No. 75.

FIG. 34.
"FAY'S," OUTSIDE.

Fig. 34.

2½ in.	\$0.85	Solid nut	{ \$0.55	1 ct.
3 "	" 0.85	only.	{ 0.60	2 "
4 "	" Spring	{ \$1.05	{ 0.65	3 "
5 "	" nut	{ 1.05	{ 0.70	5 "
6 "	" only.	{ 1.30	{ 0.75	7 "

Fig. 37. Postage.



No. 79.

FIG. 37.
"YANKEE," OUTSIDE.

The "Yankee" Calipers are made under Fay's patents, and are somewhat similar, as will be seen upon examination of cuts, but are stamped out of heavy sheet steel instead of being forged.

Fay's Inside Caliper (Fig. 35) is a very neat and desirable tool. It has a jam nut by which a setting can be made permanent and rigid. The "Yankee" (Fig. 38) is very similar, but without jam nut.



No. 78.

FIG. 35. "FAY'S," INSIDE.

Fay's.	Yankee.	Postage.
4 in. \$0.95	4 in. \$0.70	3 cts.
5 " 0.95	5 " 0.75	5 "



No. 81.

"YANKEE," INSIDE. FIG. 38.

We sell the "Yankee" Calipers quite extensively, on account of the price being much less, and we consider them superior to the old style German Calipers.

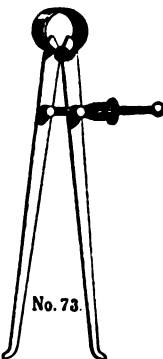
The Calipers shown in Figs. 36 and 39 are much liked by some, as they will measure inside a chambered cavity, then by pressing the legs together they can be withdrawn, and they spring back to size.



No. 74.

FIG. 36. "FAY'S," INSIDE.

Fay's.	Yankee.	Postage.
4 in., \$1.05	4 in., \$0.85	3 cts.
5 " 1.05	5 " 0.90	5 "
6 " 1.25	6 " 0.95	7 "



No. 73.

"YANKEE," INSIDE. FIG. 39.

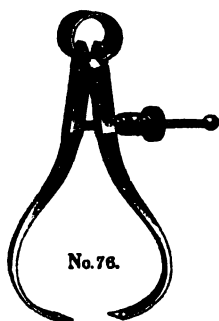


FIG. 40. "FAY'S."

The "Thread" Caliper is a tool that will be found useful in measuring screws. The points are about $\frac{1}{2}$ inch wide.

Fig. 40.			Fig. 43.		
Solid Nut.	Spring Nut.	Postage.	Solid Nut Only.		
3 in., \$0.85		2c	3 in., \$0.65		
4 " .95	\$1.05	3c	4 " .75		
5 " .95	1.05	5c	5 " .85		

STARRETT'S PLAIN LOCK-JOINT CALIPERS.

Can be instantly opened to full capacity, closed, and as quickly locked firm upon its joint.

The new Sensitive Adjustment operated as shown in cuts, avoiding the split in one leg as in Calipers formerly made, is a decided improvement.

Sizes.	Plain.	Postage.
6 in.	\$0.85	3 cts.
8 "	1.05	5 "
10 "	1.30	8 "
12 "	1.50	12 "
16 "	1.90	18 "
20 "	2.35	23 "

STARRETT'S TRANSFER LOCK-JOINT CALIPERS.

With the "Transfer" Calipers, measurements can be taken over flanges, inside of chambers, recessing eccentric straps, etc. This is done by means of an auxiliary leaf to which the independent leg is held. By loosening nut, the leg can be drawn out or pressed together to clear obstruction, then pushed back against a stop which gives measurement.

Sizes.	Transfer.	Postage.
6 in.	\$1.30	5 cts.
8 "	1.50	7 "
10 "	1.70	10 "
12 "	1.90	14 "
16 "	2.35	20 "
20 "	3.00	25 "

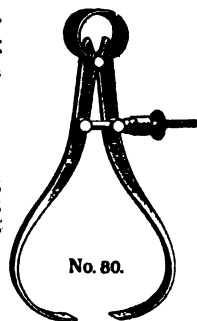


FIG. 43. "YANKEE."



FIG. 41.



FIG. 44.

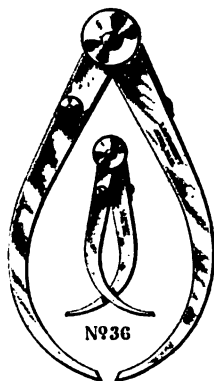


FIG. 42.



FIG. 45.

DIVIDERS.



The old style wing dividers (Fig. 46) are Bemis & Call's make. The finish—especially in joint—is much better than is usual in this class of instruments.

Size.		Size.	
5 in.,	\$0.35	12 in.,	\$0.75
6 "	.40	15 "	1.25
7 "	.45	18 "	1.75
8 "	.50	24 "	2.25
10 "	.65	30 "	3.50

FIG. 46.

COOKE'S DIVIDERS.



Fig. 47. A standard tool of excellent quality and reasonable in price. They are made with either single or double extension points, which can be replaced by pencil. Starrett makes a similar tool, better finished but much higher in price, and we do not think they are worth the difference.

Size.	Single.	Double.	Postage.
6 in.	\$0.65	\$0.70	5 cts.
7 "	.75	.80	7 "
8 "	.80	.90	9 "
10 "	.90	1.00	11 "
15 "	1.50	1.60	15 "

Caliper points, 50 cts.

FIG. 47.

KIDD'S PARALLEL DIVIDER.

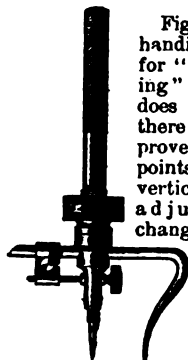
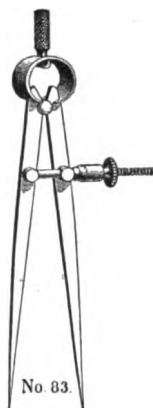
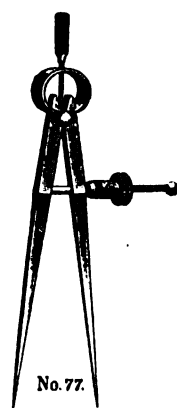


Fig. 48 is the neatest and handiest tool yet designed for "laying out" or "spacing" fine work. The cut does not do it justice, as there have been several improvements made. Its points are always parallel, vertical and rigid, has fine adjustment quickly changed to different sized circles or spacings. Each tool has two points, 1½ and 5 in. long. Will describe a 7 inch circle. \$1.50.

FIG. 48. Pencil points, 50 cts. extra.



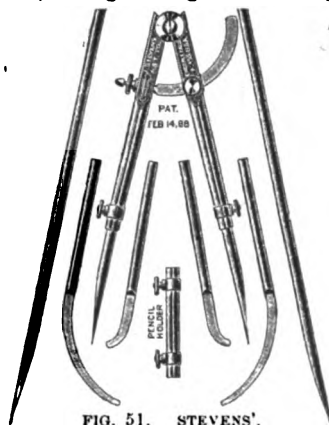
No. 83.



No. 77.

FIG. 49. "YANKEE." FIG. 50. "FAY'S."
 2½ & 3 in. \$0.70 solid nut. \$0.85 solid nut.
 4 " .75 " " 1.20 spring "
 5 " .80 " " 1.20 " "
 6 " .85 " " 1.50 " "

Stevens' Divider and Caliper is an extremely useful combination tool. One pair of points is 5½ and the other 14 inches long. With the larger pair, a 4 foot circle may be struck. When fitted with small points the ends may be reversed, protecting points from injury and adapting the tool for convenient carriage in pocket or tool chest. Greatly improved of late, in being made lighter and stronger.

FIG. 51. STEVENS'.
\$3.60. Postage, 30 cents.

TRAMMEL POINTS, OR BEAM COMPASSES.*

Trammel Points are indispensable to Machinists, Pattern-makers, Carpenters and Millwrights. There is practically no limit to circles which they can describe or distance which can be spaced. They are made to slide on a wood beam, and are therefore very light. Dividers above fifteen inches are not as desirable as Trammels, as their weight makes them awkward to handle. There are numerous kinds made. In our judgment, those shown here are a good selection.

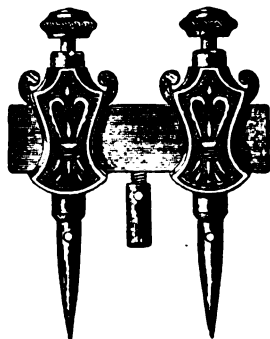


FIG. 52. STANLEY'S.

Fig. 52 is a good, cheap Trammel that will answer many purposes; are not adjustable. Either of the points can be removed and a pencil inserted.

- No. 1, \$0.85 small size. Postage, 4 cts.
 " 2, 1.00 medium size. " 7 "
 " 3, 1.50 large size, " 12 "

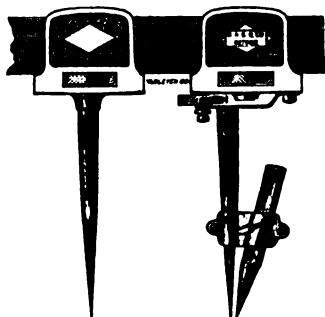


FIG. 53. DIAMOND.

The Diamond Trammel Point (Fig. 53) is the neatest and best medium-priced tool of the kind on the market.

	Without Adjustm't.	With Adjustm't.	Size.	Postage.
No. 1,	\$1.15	\$1.60	$\frac{1}{2}$ x $\frac{1}{2}$	4 cts.
" 2,	1.35	1.80	$\frac{3}{4}$ x $\frac{3}{4}$	6 "
" 3,	1.60	2.25	$\frac{1}{2}$ x $\frac{1}{2}$	8 "
" 4,	2.25	3.60	$\frac{1}{2}$ x $1\frac{1}{2}$	16 "

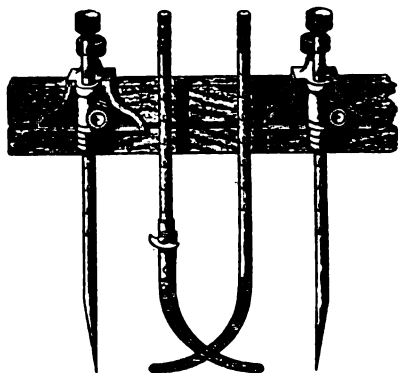


FIG. 54. No. 51.

Cook's Beam Trammels (Fig. 54) are of a high class, and possess many advantages. First: the points can be extended in depth to span projections. Second: both points are graduated, and can always be set parallel to each other. Third: when one surface is below or above the surface from which the centre distance is to be spaced, one point can be raised or lowered to keep the points in relation to each other. Fine adjustment can be had by rotating the points in their sockets, as they are made eccentric.

\$2.90 complete. Postage, 22 cts.
 2.25 without Caliper legs. " 16 "

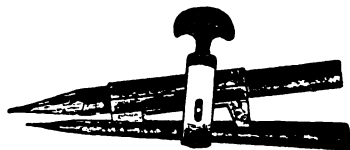


FIG. 55. PENCIL HOLDER.

The Pencil Holder (Fig. 55) is to be attached to dividers.

\$0.25 Postage paid.

* See square attachment, page 31.

CENTRE, OR SCREW GAUGES.

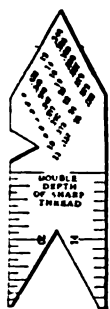


FIG. 56. Gives size for full thread .577
\$.025. Nearest size is $\frac{1}{16}$ — .578

In drilling holes to be tapped, judgment should be exercised according to location and metal. In above example a drill $\frac{1}{16}$ inch would prove more satisfactory, as a sharp V is not necessary nor easily obtained in ordinary practice. Post paid.

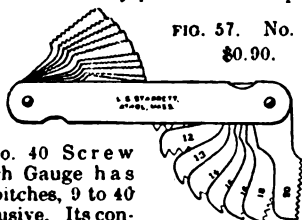


FIG. 57. No. 40.
\$.0.90.

No. 40 Screw Pitch Gauge has 20 pitches, 9 to 40 inclusive. Its construction is such that internal threads can be measured.

No. 11 $\frac{1}{2}$ differs from No. 40 in having 8, 11 $\frac{1}{2}$ and 27 in place of 36, 38 and 40. The 8, 11 $\frac{1}{2}$ and 27 threads are pipe sizes. Price same as No. 40. Postage, 2c.

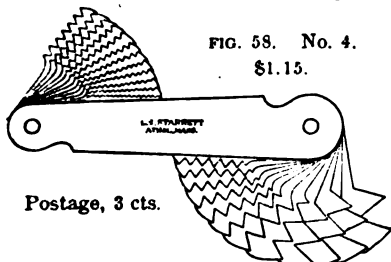


FIG. 58. No. 4.
\$1.15.

Postage, 3 cts.

Fig. 58. New Screw Pitch Gauge made in two sizes. No. 4 has following pitches:

4, 4 $\frac{1}{2}$, 5, 5 $\frac{1}{2}$, 6, 7, 8, 9, 10, 11, 11 $\frac{1}{2}$, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28 and 30.

No. 5 has 26 pitches. All even threads from 32 to 82 inclusive. Same price as No. 4.



FIG. 59. \$1.60.
Postage, 3 cts.

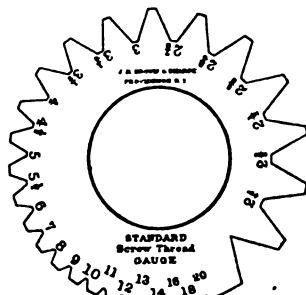


FIG. 60. \$1.80. Postage, 2 cts.

Figs. 59 and 60 show two styles of gauges for U.S. Standard Threads, called Sellers or Franklin Institute. Both have pitches, as shown in Fig. 60, and give exact depth for each pitch, so that tool can be properly ground.

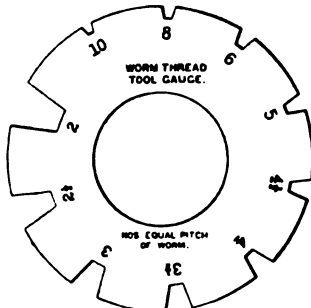


FIG. 61. \$2.25. Postage, 2 cts.

Designed only to grind tools by, for cutting worms, or worm threads.

WIRE GAUGES.

Many are the annoyances resulting from the lack of uniformity in Wire Gauges. Countless pages in technical publications have been filled with suggestions, scoldings, etc., but the conditions have not been materially changed in the past thirty years, nor is the outlook for a uniform standard very promising.

There are five or six different so-called Standard gauges, but the "English" (Birmingham or Stubbs'), and "American" (Brown & Sharpe), are the only ones in general use; probably as high as 99 per cent. of the gauges used in this country are either one or the other of these.

The B. & S. gauge was devised with a view to overcome the irregularity of variations in the old gauge. Its divisions are increased by a regular geometrical progression, while in the English gauge they are rather haphazard, as will be seen by comparing the tables elsewhere. The B. & S. gauge was brought out about thirty-five years ago, and was adopted as a standard by the brass manufacturers of the United States, in 1858. And it seems strange—if not ludicrous—that these brass manufacturers, unless otherwise ordered, furnish sheet brass by B. & S. gauge, sheet copper by English, hard-drawn copper and German silver wire by B. & S. gauge, regular copper and brass wire by English, brazed copper and brass tubing by B. & S. gauge, seamless tubing by English.

Those who use large quantities of these goods do not necessarily meet with the same annoyances as do buyers from

stock, for the reason that when a fair-sized order is placed, manufacturers of all sheet metals, wire or rods, brass, iron or steel, will furnish same to any reasonable degree of accuracy by thousandths of inches, and many of the large consumers use the Micrometer Caliper exclusively in ordering.

A wire gauge is one of a few tools that never (?) "wears out." Most owners are like the old fellow who, when in a dispute, in which the accuracy of his gauge was called in question, said, "I know it's all right, 'cause I have used it over thirty years."

By constant wear, the sizes on gauge may change enough to make it perfectly useless, where even the slightest degree of accuracy is required; but we never saw one discarded.

Our sales in the past have been about eight English to one B. & S., but the proportion of the latter is increasing. Brown & Sharpe have always charged about seventy-five per cent. more for the American than for the English, the reason being, we suppose, that they have always had practical control of this system. We do not see why they should cost any more to make, and think that if B. & S. had made prices of both the same (or nearly so), we would now be many years farther advanced towards a universal standard, in this country, at least.

At all times, in ordering sheet metal or wire, it is advisable to specify which gauge is used.

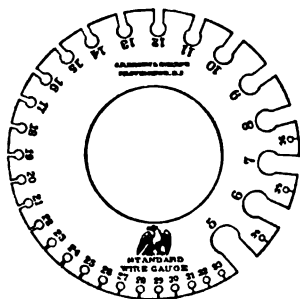


FIG. 62.

B. & S.

Postage.

No. 5 to 36,
" 0 to 36,

\$2.25
3.15

2 cts.
5 "

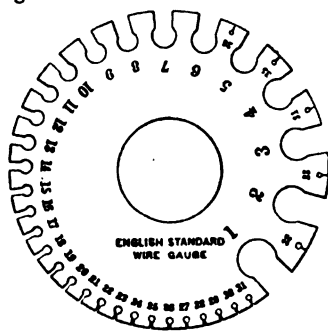


FIG. 63.

English.

Postage.

No. 6 to 36,
" 1 to 36,

\$1.35
1.80

2 cts.
5 "



FIG. 64.

000 to 25, \$2.25. 1 to 32, \$2.70

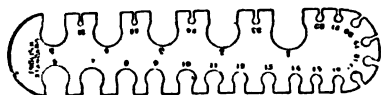


FIG. 65.

1 to 26, \$1.25 Postage, 2 cts.
0 to 36, 1.75 " 5 "

Oblong Wire Gauges are preferred by some. The one shown in Fig. 64 is used principally in rolling mills. A strong, heavy tool.

Fig. 65 is lighter, and for ordinary use it serves fairly well.

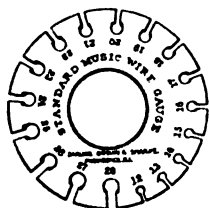


FIG. 66. \$1.35. Postage, 1 cent.

The use of this Gauge is fully described elsewhere in connection with music wire.

The Wire and Caliper Gauge shown in Fig. 67 is made by Darling, Brown & Sharpe. The jaws and wire gauge are hardened.

This tool is used principally by steel and iron rollers; it is equally useful to the master mechanic and foreman in selecting iron, steel, and heat stock.

Has English standard sizes from No. 1 to 39 inclusive. Caliper tongue is graduated to 32nds; will measure 1/4 inch flat, round or square stock.

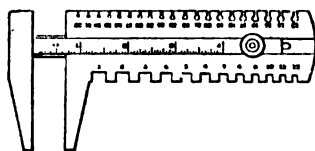


FIG. 67. \$6.30. Postage, 10 cts.

COMPARATIVE COST OF SMALL TOOLS.*

* * * It won't do to jump at the cost of small tools in the shop.

Figures printed on a manufacturer's price-list often look big, but if the accurate cost of small home-made shop tools is kept, something will be found out.

What shop can make an inch tap as cheap as one can be bought?

When a concern fits up a plant specially for making a certain class of tools, it is safe to say that their price-list is about fifty per cent under the cost of home-made tools.

Gear Cutting Cutters are now made so near absolute perfection as to be unquestionable, and can be bought for about three dollars each. It looks like a good deal of money for very little steel, but have one made in the shop and watch it.

A steel forging of unreasonable size keeps a blacksmith and helper busy an hour; your draughtsman spends an hour drawing a shape on tin; your best paid lathe man works a full day turning the cutter, if he don't make a special tool for it, and he works a day on the tool if he does make it; then, half a day is spent in milling and filing clearance on it, and you may put in proper wages and figure up the cost. When it comes to tempering, it may be done, or it may be done for; it depends on luck if tempered without cracking. The thing may be true and may not be; if it isn't true it won't cut a space anything like the draughtsman's tin drawing, which may have been a good shape, and may not have been.

Price-lists are often condemned prematurely. * * *

*From Chordal's Letters, in *The American Machinist*.

POCKET SCREW AND WIRE GAUGE.

This is used for obtaining size of Machine or Wood Screws, numbers 0 to 30. (For decimal diameter sizes of Screws, see Machine Screw List). On opposite edge, it is divided into fractional parts, giving means of comparison.

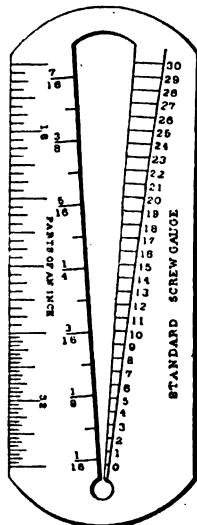


FIG. 68. \$2.25
Postage, 2 cts.

In connection with list of Machine Screw Taps will be found an article on this subject, which should be carefully read, and if possible, remembered.

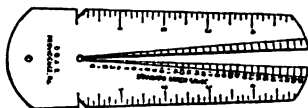


FIG. 69.

Regular, \$3.15 Postage, 2 cts.
Extra thick, 4.05 " 5 "

Fig. 69 shows another style of the Screw and Wire Gauge. Opposite side differs from one shown in Fig. 68, in having the English wire gauge marked on one edge, and fractions of an inch on corresponding edge, in place of the American gauge.

TWIST DRILL AND STEEL WIRE GAUGE.

Used for measuring Twist Drills and Steel Drill Rods.

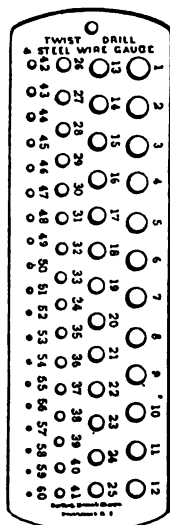


FIG. 70.

Jobbers' Drill Gauge, \$2.05
Postage, 5 cts.

This is same in design as one shown in Fig. 70. Has all fractional sizes from one-sixteenth to one-half inch, varying by sixty-fourths of an inch. This gauge is five by one and one-half by three thirty-seconds of an inch thick.

Letter Size Drill Gauge, \$2.50
Postage, 5 cts.

This is used for gauging the letter sizes of drills from A to Z, as described and priced in drill list. It is made by P. S. Stubs.

Elliott's Tap Drill Gauge, \$1.00
Postage, 3 cts.

This is a useful little tool, giving sizes of drills necessary to be used in tapping for machine screws. It gives the sizes of screw and drills from No. 4 to 24, based on threads commonly used.

It is of common occurrence for us to receive orders for all kinds of wire, and to find after order has been filled that the drill gauge was used in specifying.

This is annoying and troublesome, both to ourselves and customers, and we urge that customers use this gauge only for the purposes for which it is intended.

A table of Decimal Equivalents, corresponding to the numbers on gauge, will be found elsewhere in this catalogue, in connection with Steel Drill Rod.

\$1.15
Postage, 3 cts.

SURFACE GAUGES.

There has been an epidemic in this line for the past year or two. A new one is born about every month. The cuts illustrate Gauges that range in price according to their actual value. They are, in quality, workmanship and convenience, in our judgment, a good selection.

Fig. 71 Starrett's popular medium priced tool for general use. Made in three sizes, of which one has an extension to make spindle 18 inches high.

Fig. 72 represents Starrett's New Surface Gauge, with Micrometer Adjustment reading to thousandths of an inch. Its design presents both grace and beauty. Sizes same as those of Fig. 71.



FIG. 71 No. 52

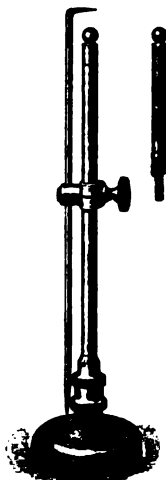


FIG. 72 No. 53

	Plain.	Micrometer Adjustment.
5 in.,	\$1.70,	\$2.25
12 "	2.35,	3.15
12 "	2.75, with Extension	3.60

Fig. 73 represents Carr's Universal Surface Gauge. Of especial value on planer, as work can be laid off from cross-head when it is impossible to use the table surface, as spindle can be swung to angles from the base, which admits of its reaching over projections. There are numerous

places where this feature would prove very desirable. On one side a V is provided by which a distance can be described on circumference of circles or shafts. It can also be used as an ordinary gauge.

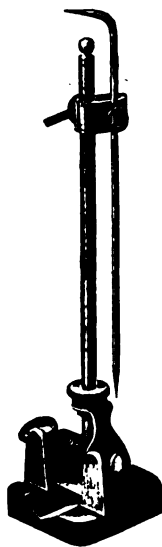


FIG. 73

No 1,	\$2.00
" 2,	2.25

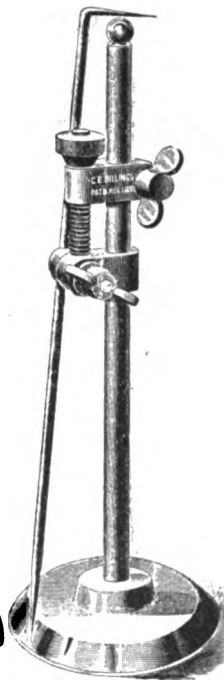


FIG. 74.

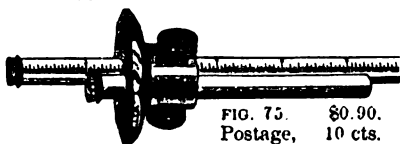
9 inch,	\$2.75
12 "	3.00

No. 1 has two spindles, making a 6 and 9 inch gauge. No. 2 has two spindles, making a 12 and 18 inch gauge. It has an eccentric adjustment.

Fig. 74 is a very neat Gauge, made by the Billings & Spencer Co. Every part is hardened. The base is ground perfectly square with the spindle. This Gauge is especially useful on milling machine work on account of its design, being compact, light and rigid.

A great many of the tools in catalogue can be sent by mail and we will be pleased to state cost of mailing upon application.

MISCELLANEOUS GAUGES.

FIG. 75. \$0.90.
Postage, 10 cts.

BARRETT'S ROLLER GAUGE.

The above cut shows a good tool for general rough work. Instead of permanent scriber, hardened steel rolls, beveled to sharp edges, rotate on hardened screws. The long beam is $\frac{3}{4}$ x 8 inches, graduated to thirty-seconds of an inch. Short beam is plain, $\frac{1}{4}$ x 4 inches long, and enters the head-flush. Its uses are various.

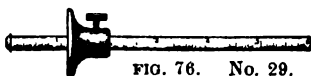
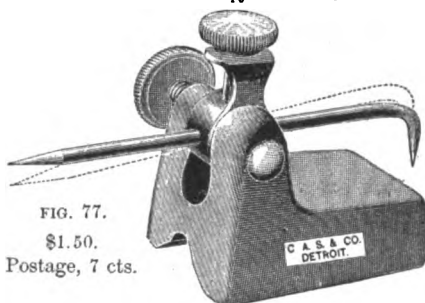


FIG. 76. No. 29.

Starrett's Scratch Gauge (Fig. 76) is a very serviceable tool in every-day shop practice. Its value can only be appreciated by actual use. Head is hardened, and can be held at any point on the beam.

The scriber consists of a thin, square piece of steel, hardened, and firmly held to end of beam by a screw. Can furnish with beam plain, or graduated to sixty-fourths of an inch.

	Graduated.	Plain.	Beam.	Postage.
5 in.	\$0.90	\$0.60	$\frac{1}{4}$ diam.	4 cts.
6 "	1.15	0.70	$\frac{1}{2}$ "	5 "

FIG. 77.
\$1.50.
Postage, 7 cts.

Carr's Diminutive Scribing Block, or Surface Gauge (Fig. 77), is a new tool. The needle has an adjustment, by means of the top screw, and can be held rigid. The V slot in the base will be found very useful and desirable, in truing work from a boring bar, also for setting cutter in same. Forms a scratch and depth gauge.

Depths have to be obtained. Hence a gauge for this purpose is as essential as a pair of calipers. Starrett's No. 40, shown in Fig. 78, is the most desirable tool of this class. It consists of a plain body, $3 \times \frac{1}{4} \times \frac{1}{8}$, with one beveled edge, nicely finished. Is made to receive a scale graduated on one side to the other to sixty-fourths of an inch, which can be firmly of measurement. It near the extreme cut, making it a for obtaining depths in difficult places.

FIG. 78. DEPTH GAUGE.
With 4 in. scale, \$1.10.
Postage on both, 2 cts.
With 6 in. scale, \$1.35.

Starrett's No. 45, differs from No. round spindle $\frac{1}{4}$, as shown in Fig. the beveled edge. tool for ordinary

shown in Fig. 79, 46, in having a instead of a scale, .78, and without It is a very good work.



FIG. 79. \$0.65. Postage, 2 cts.

FIG. 80. DEPTH GAUGE.
Postage, 3 cts.

This little tool was brought out by the Mason Regulator Co. Its principal merit is the low price at which it sells; and while it might serve for ordinary purposes, it cannot be compared for accuracy, etc., with those shown above.

CALIPER GAUGES.

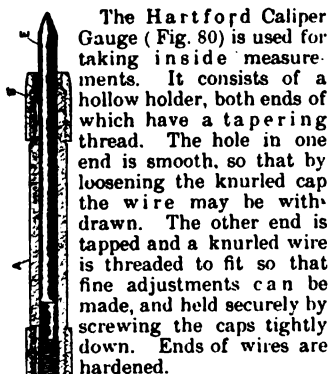


FIG. 80.

The Hartford Caliper Gauge (Fig. 80) is used for taking inside measurements. It consists of a hollow holder, both ends of which have a tapering thread. The hole in one end is smooth, so that by loosening the knurled cap the wire may be withdrawn. The other end is tapped and a knurled wire is threaded to fit so that fine adjustments can be made, and held securely by screwing the caps tightly down. Ends of wires are hardened.

Holders are $\frac{1}{4}$ inch diameter, nickel-plated. Each size has three lengths of wires $\frac{1}{16}$ inch diameter.



FIG. 80.

Postage.

No. 1, \$0.90, from 3 to 6 $\frac{1}{4}$ inches. 3 cts.
 " 2, 1.00, " 6 " 16 " 6 "

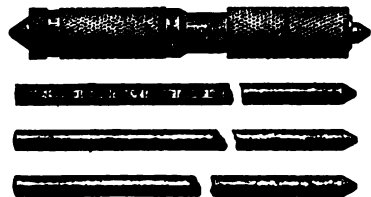


FIG. 81.

Price, \$1.75. Postage, 3 cts.

Slacomb's Improved Inside Caliper (Fig. 81) with Micrometer Adjustment is a new tool, measuring from 2 $\frac{1}{4}$ to 9 inches. It will be found an indispensable tool for sizing holes to make running, driving, force or shrink fits. All these different fits made with the ordinary Calipers require skill and experience, and are usually made by guessing and testing.

With this tool the last named method is dispensed with, as the user is enabled to bore a hole and know exactly its diameter in thousandths of an inch. Making the above named fits is an important matter met with in daily practice. With the above tool such work is more easily done and can be depended upon.

The base shown here is made to be used in connection with the inside Caliper, making same a depth gauge with micrometer adjustment. A depth gauge is formed by removing the measuring cap from the micrometer thimble and screwing into its place the base, then running the graduating wire down through this base, using the same chuck in clamping the wire. The base is hardened and accurately ground.

To prove the accuracy of the micrometer screw, bring zero on the thimble to correspond with zero on the barrel; then push wire through base, split the first line and clamp wire; then turn the micrometer one-quarter inch and the next line should be in relative place to the first line.



FIG. 82.

Price, \$0.75. Postage 2 cts.

As a depth gauge this tool is not excelled.

Postage, on tool complete, 8 cts.

AGENTS.

We wish to say that we employ no traveling agents, neither do we establish "Shop Agencies," as our prices are so low they do not admit of paying or allowing commissions. This book is our "Traveling Man." We know that it is not eloquent or persuasive in the sense that a good talker is; but it brings plainly to notice a thousand and one different articles that an agent could not begin to know, or think of.

We can send it to you for a few cents, while it costs many dollars to send a traveler. It is compact in size and shape, takes up but very little room, and you can always have it with you (unless someone steals it, which you will have to look out for).

Finally, it is honest, and makes no promises it cannot fulfill.

If you have any friends who use any of the goods shown in this catalogue, and to whom you think the book would be of some benefit, if you will kindly send us their address, we will be pleased!

STANDARD CALIPER GAUGES.*

FIG. 83. Price, per set, \$100.00.

These Gauges are hardened and ground accurately to size, one end answering for outside, and the other for inside, calipering. Their form gives lightness and strength, making them preferable to plugs and rings, for frequent use. Each full set is neatly arranged in a box, and contains sizes from one-quarter to two and a half inches diameter, varying by sixteenths of inches, up to two inches diameter, and above, by eighths of inches.

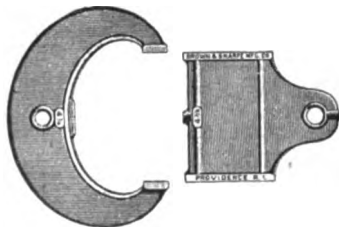


FIG. 84.

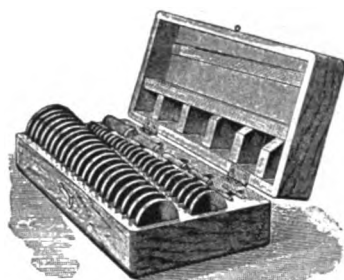
We can also furnish the Standard Caliper Gauges, from three to seven inches, in two parts for each size (see Fig. 84), one part for inside, the other for outside measurement.

STANDARD REFERENCE DISKS.

In bringing these out, the Brown & Sharpe Manufacturing Co. have, in the language of the patent medicine people, "conferred a boon on mankind." They furnish, at a reasonable price, a very complete set of reliable gauges, in most convenient form.

We have sold and used a number of sets, and heartily recommend them.

Can furnish any of the sizes separately, with or without handles.

FIG. 85. STANDARD REFERENCE DISKS..
Price, per set,

These Disks are used, frequently without handles, for setting calipers, testing measuring tools, and determining sizes in shop practice. With handles, they are used as Internal Cylindrical Gauges. They are designed, however, to serve principally for reference, not as working gauges. They are made of steel, hardened and accurately ground to size. The diameter of each is stamped upon it in sixteenths, and also in decimals of an inch. The sides of the disks are left unpolished, the finish being the same as that of hardened wire gauges. A complete set consists of forty-five disks and six handles, and is neatly arranged in a suitable box. The quarter and five-sixteenth inch disks are furnished with the handles attached.

STANDARD INTERNAL AND EXTERNAL CYLINDRICAL GAUGES.

Internal.



External.



FIG. 86.

Each set is arranged in a box, and contains sizes from one quarter to two inches, varying by sixteenths of an inch.

Special sizes made to order.

* We will, upon application, send price lists, giving prices of separate gauges in the different lines shown above; also descriptive circulars and price lists of the very complete line of Gauges made by the Pratt & Whitney Co. and Jas. A. Taylor & Co.

This small Register (Fig. 87) tallies from one to one thousand, and can be set to zero quickly. It is simple in construction, and can be carried in the vest pocket.



FIG. 87. \$3.00. Postage, 5 cts.

It can be put to good use in many places. Railroad men use it for keeping tally of ties being laid; telegraph construction men for tallying poles used; cattle men for counting cattle and sheep; in fact, it can be used for many purposes where a correct count is desired to be kept.

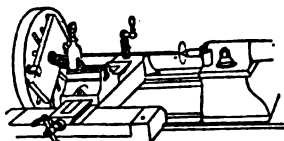


FIG. 88 \$1.50. CENTRE INDICATOR.

Postage, 6 cts.

The primitive way of locating a centre in work, clamped to the face-plate in the lathe, was by describing a circle from given centre, then clamp a point, usually a scratch awl, in tool post, and by endless rappings bring the circle to run true, using point as indicator. This not only consumes time, but is very straining to the eyes and the best workman is liable to err.

The Centre Indicator (Fig. 88) consists of a holder, in one end of which an offset spring, $\frac{1}{4} \times 1$, is firmly held. In the other end a socket is formed, in which a steel ball rests. The needle is steel, with hardened point, the long, projecting end is of pure aluminum, which reduces vibration to a minimum. A heavy needle will always vibrate, making

it difficult to determine when work is true. The ball is adjustable on steel end of the needle. When ball is fastened three-eighths of an inch from end, then hold this point in the centre to be trued, and whatever the centre is out, the other end will indicate the amount thirty-two times, and it gives the user the exact spot to rap on to throw it in place, until it is brought true. With this tool there is no doubt or hesitancy, as the needle will be true with the tail centre when the true centre of the work is found.

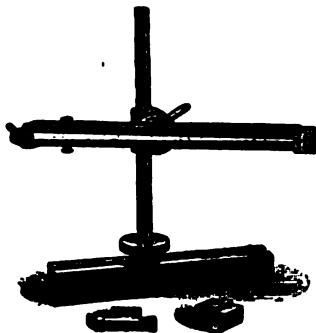


FIG. 89.

BROWN & SHARPE'S TEST INDICATOR.

With the Test Indicator (Fig. 89) a degree of inaccuracy of one one-thousandth of an inch can be readily determined on a plane surface; on the top, bottom or side of a piece of work; the end movement of a spindle, or the extent of which the spindle runs out of true.

The post can be clamped at any point on the base. The arm holding the needle, or "pointer," can be held at any point on the post, or in any position desired.

The indexing finger may be brought to zero by two screws, as shown.

The points of the pins upon which the finger swings are provided with an adjustment to compensate for wear.

Length of base,	8 inches.
Height of post,	9 "

Price, \$25.00

COMBINATION SQUARES.

As a rule, Combination Tools do not amount to much; there are but few exceptions. Starrett's Combination Square is one of these few. It has been on the market about twelve years, and its excellent qualities have been well tested.

We know of no other tool that has been so generally and largely sold to all classes of mechanics, both wood and metal workers. It embraces a list of tools which, if bought separately, would cost at least twice—and perhaps three times—as much. All parts are accurately and well made. The price has lately been reduced materially, by reason of largely increased production and improved facilities.

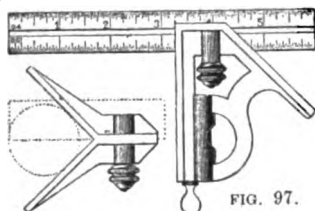


FIG. 97.

Starrett's Square, shown above, combines the following tools: Try square, with adjustable blade, centre square, mitre square, scale, straight edge, depth gauge, level, plumb, and scratch awl. A Bevel Protractor Head (Fig. 119) is made to fit these squares, making it a most complete tool.

4 in., has no centre head or level,	\$0.90
6 " "	\$1.80
9 " with	2.25 without
12 " Centre	2.70 Centre
18 " Head.	3.15 Head.
24 " "	4.05
	3.15

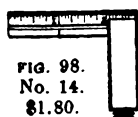


FIG. 98.
No. 14.
\$1.80.

Postage, 2c.

Starrett's Double Square (Fig. 98) is made of solid steel stock, $\frac{1}{4} \times \frac{1}{2} \times 1\frac{1}{2}$, milled, to receive sliding-blade, $\frac{1}{4} \times \frac{1}{2} \times 2\frac{1}{2}$, graduated on both edges at one side only, to sixty-fourths and thirty-seconds. A narrow blade, one-eighth of an inch wide, not graduated, is made to fit the stock, and is of special value in getting depths and squaring surfaces in limited space.

Price of narrow blade, \$0.30 extra.
" " bevel " 0.30 "

MACHINISTS' SQUARES.

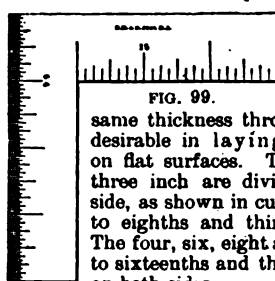


FIG. 99.

The same thickness throughout, are desirable in laying out work on flat surfaces. The two and three inch are divided on one side, as shown in cut, other side to eighths and thirty-seconds. The four, six, eight and ten inch to sixteenths and thirty-seconds on both sides.

Size,	2 in.	3 in.	4 in.	6 in.	8 in.	10 in.
Price,	\$0.90	1.35	1.80	2.70	3.60	4.50
Thickness,	1/4	1/4	1/4	1/4	1/4	1/4
Postage,	1c.	2c.	3c.	4c.	6c.	9c.

Our sales in the past have been about equally divided between the Graduated and Hardened Try Squares (Figs. 100 and 101). The Graduated Squares are not as much cheaper than the Hardened, as would seem to be indicated in list prices. Hardened Squares are measured inside of stock; Graduated are measured over all. For example, the four and one-half inch Hardened Square is within one-half inch as long as the six inch Graduated, and there is but little difference in price; other sizes in like proportion. We feel called upon to explain, as we have never seen this fact mentioned elsewhere.

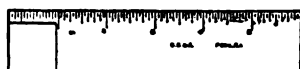


FIG. 100.

GRADUATED, NOT HARDENED.

Size,	3 in.	4 in.	6 in.	9 in.	10 in.
Price,	\$1.80	2.25	3.15	5.40	6.30
Postage,	4c.	7c.	13c.	28c.	

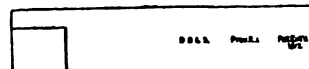


FIG. 101. HARDENED.

	Postage.		
1 1/4 in.,	\$1.80	2c.	12 in., \$9.00
3 " "	2.70	6c.	15 " 13.50
4 1/4 " "	3.60	12c.	18 " 16.20
6 " "	4.50	16c.	24 " 27.00
9 " "	6.30	35c.	30 " 36.00

SQUARES.

The Squares shown in Figs. 102 to 109 are of the class usually sold to wood-workers; they are as well made and nicely finished as the price will warrant, and fully equal to any in their class.



FIG. 102. No. 20.

Rosewood stock and graduated steel blade (blued). Is a good common Try Square.

3 in.	4½	6	7½
\$0.20	.20	.25	.30
9 in.	10	12	15
\$0.35	.40	.45	.60
			.85

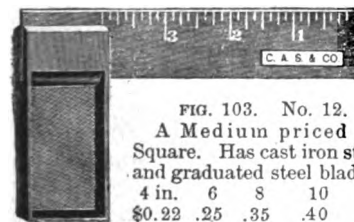


FIG. 103. No. 12.

A Medium priced Try Square. Has cast iron stock and graduated steel blade.

4 in.	6	8	10	12
\$0.22	.25	.35	.40	.50



FIG. 104. No. 10.

Improved Try Square: Has cast iron stock into which rosewood sides are inlaid, making it light and strong.

3 in.	4	6	8	9	10	12
\$0.40	.50	.60	.80	.90	1.10	1.25



FIG. 105. No. 14.

Shows a Try Square with cast iron stock and sliding blade. Very convenient.

4 in.	6 in.
\$0.25	\$0.30



FIG. 106. No. 2.

A plain Try and Mitre Square, with rosewood stock and graduated blade.

4½ in.	6 in.	7½ in.	9 in.	12 in.
\$0.38	0.42	0.50	0.60	0.75



FIG. 107. No. 1.

Try and Mitre Square, with cast-iron stock, inlaid with rosewood, and graduated blade.

4 in.	6 in.	8 in.
\$0.50	0.65	0.75

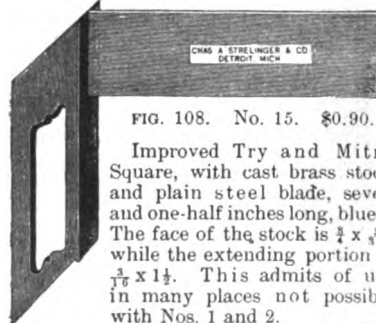


FIG. 108. No. 15. \$0.90.

Improved Try and Mitre Square, with cast brass stock and plain steel blade, seven and one-half inches long, blued. The face of the stock is $\frac{1}{4} \times \frac{3}{4}$, while the extending portion is $\frac{3}{4} \times 1\frac{1}{2}$. This admits of use in many places not possible with Nos. 1 and 2.

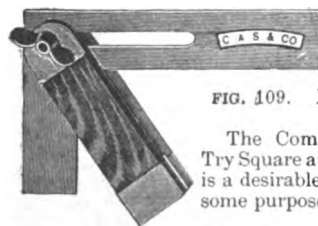


FIG. 109. No. 24.

The Combination Try Square and Bevel is a desirable tool for some purposes.

6 in.	8 in.	10 in.	12 in.
\$0.45	0.55	0.65	0.75

There are now on the market a great many different makes of Speed Indicators. Most all of them are well made, but differ materially in design and convenience.

The cuts show a selection, made with care and consideration, as regards workmanship and price.

Fig. 90 shows a good, low-priced tool for all ordinary purposes.

Fig. 91 illustrates a medium-priced Indicator having a stop motion. The spur works independently of the screw, being held from contact by a spring incased (as shown), and brought in contact by pressure, which can be applied without taking the eyes from the watch. Is self-registering to five thousand.

The McDonnell Speed Indicator (Fig. 92) registers to one thousand revolutions. The body constitutes the handle. Has rubber tip on end of spindle, a silver-plated dial back covered with a watch crystal. It is an excellent tool for the money.

The Ulster Indicator (Fig. 93) is a high grade article, and has a stop motion.

Its mechanism compares favorably with that of a watch, as every part is perfectly fitted, and all parts subject to friction are so constructed as to reduce it to a minimum. For high speeds this tool will be found accurate. Works right or left.

Besides the above, we can furnish Church's Double Speed Indicator. Price, \$1.35. Postage, 5 cts.

The Fowler Speed Indicator, which registers to five thousand revolutions. Price, \$2.25. Postage, 6 cts.

The Heath Self-Timing Speed Indicator, with a watch movement. Registers to five thousand revolutions. Price, \$90.00. Sale somewhat limited, on account of high price.

SPEED INDICATORS.

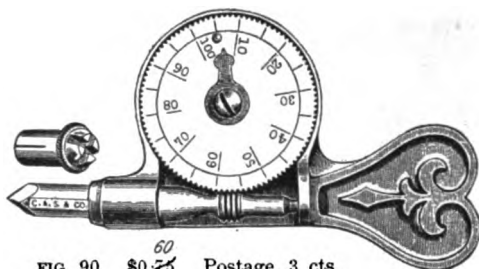


FIG. 90. \$0.⁶⁰/₇₅. Postage, 3 cts.

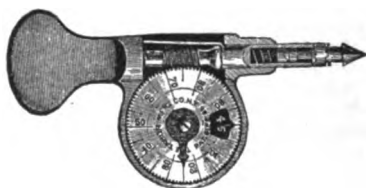


FIG. 91. \$1.25. Postage, 3 cts.

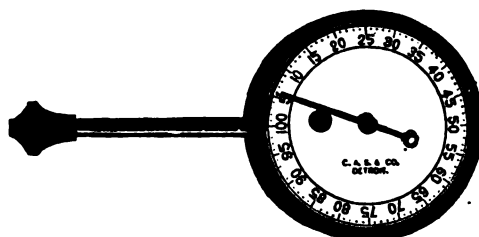


FIG. 92. \$2.00. Postage, 2 cts.

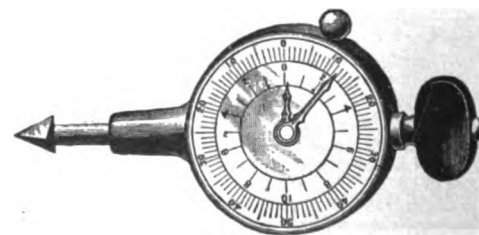


FIG. 93. \$6.00. Postage, 3 cts.



FIG. 94. \$7.00. Postage, 15 cts.

Taylor's Speed Indicator (Fig. 94) is of the same class as the Ulster. It differs in that it has not the stop motion, and is also different in design, but quality of workmanship and accuracy of registration are identical. Works right or left.

The Portable Tachometer (Fig. 95) is similar in construction to the Tachometer for permanent attachment. By applying this instrument by hand to the centre of rotating shafts, it will instantly and correctly indicate the number of revolutions of the shaft per minute.



FIG. 95. \$55.00.

This instrument is arranged with a dial for one thousand revolutions; but with it are also furnished two sets of geared wheels, in proportion of one to two, by which the speed can be reduced to five hundred or increased to two thousand revolutions.

Diameter of dial, $2\frac{1}{2}$ inches; depth of case, 3 inches; entire length, including handle and detachable point, 11 inches. Total weight, including Morocco case, 5 lbs.

This instrument is of excellent workmanship, plated and finished. It is contained in an elegant case. We confidently recommend it for its adaptability in obtaining accurate indications of the variations in speed of fast-running machinery. Can furnish several styles of Tachometers.

STROKE OR REVOLUTION COUNTER.

These instruments are used on Engines, Pumps, Printing Presses, and in all places and situations where it is desirable to count and register the number of operations performed.

Until quite recently, they have been furnished only in an expensive and elaborate form, and have been sold at prices ranging from \$15.00 upwards.

The Counters shown and priced here are well made, reliable instruments. We will guarantee them to work accurately, and the prices are very reasonable. They all count up to 100,000 excepting Nos. 6 and 7, which register 1000 and 100.

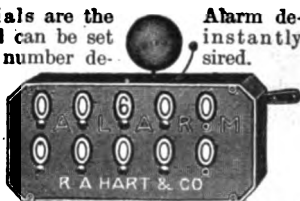


FIG. 96. "GEM" COUNTER.

The lower dials on the Alarm Counter, Fig. 96a, run like the usual Counter. The

upper dials are the vice, and can be set to any number desired. Alarm device instantly sired.

FIG. 96a.
DOUBLE
DIAL
ALARM
COUNTER



When that number is completed, the bell will ring. To illustrate, set the Alarm on 600, if this is the number desired, with lower dials on ciphers. First revolution of machine the lower dials will show 1, and the upper dials 599, and so on until the 600 are run, when the upper dials will stand at ciphers and the bell will ring. No. 1, \$12.00, Double Dial Alarm, 5×8 in. and has $\frac{1}{4}$ in. figures.

No. 2, \$7.50, Gem, 3×8 in., $\frac{1}{4}$ in. figures
 " 4, 7.00, " $2\frac{1}{2} \times 6$ " $\frac{1}{4}$ " "
 " 5, 6.00, " $2\frac{1}{2} \times 5$ " $\frac{1}{4}$ " "
 " 6, 4.50, " $2\frac{1}{2} \times 4$ " $\frac{1}{4}$ " "
 " 7, 3.00, " $2\frac{1}{2} \times 3$ " $\frac{1}{4}$ " "

COMBINATION SQUARES.

As a rule, Combination Tools do not amount to much; there are but few exceptions. Starrett's Combination Square is one of these few. It has been on the market about twelve years, and its excellent qualities have been well tested.

We know of no other tool that has been so generally and largely sold to all classes of mechanics, both wood and metal workers. It embraces a list of tools which, if bought separately, would cost at least twice—and perhaps three times—as much. All parts are accurately and well made. The price has lately been reduced materially, by reason of largely increased production and improved facilities.

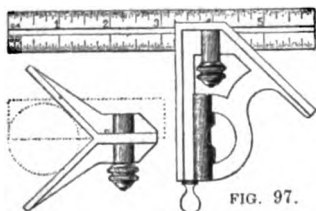
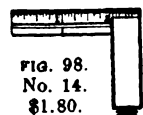


FIG. 97.

Starrett's Square, shown above, combines the following tools: Try square, with adjustable blade, centre square, mitre square, scale, straight edge, depth gauge, level, plumb, and scratch awl. A Bevel Protractor Head (Fig. 119) is made to fit these squares, making it a most complete tool.

4 in.,	has no centre head or level,	\$0.90
6 "		\$1.80
9 "	with	2.25
12 "	Centre	2.70
18 "	Head.	3.15
24 "		4.05

FIG. 98.
No. 14.
\$1.80.

Starrett's Double Square (Fig. 98) is made of solid steel stock, $\frac{1}{8}$ x $\frac{1}{2}$ x $1\frac{1}{2}$, milled, to receive sliding-blade, $\frac{1}{8}$ x $\frac{1}{2}$ x $2\frac{1}{4}$, graduated on both edges at one side only, to sixty-fourths and thirty-seconds. A narrow blade, one-eighth of an inch wide, not graduated, is made to fit the stock, and is of special value in getting depths and squaring surfaces in limited space.

Price of narrow blade, \$0.30 extra.
" " bevel " 0.30 "

MACHINISTS' SQUARES.

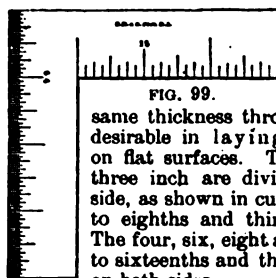


FIG. 99.

being the same thickness throughout, are desirable in laying out work on flat surfaces. The two and three inch are divided on one side, as shown in cut, other side to eighths and thirty-seconds. The four, six, eight and ten inch to sixteenths and thirty-seconds on both sides.

Size,	2 in.	3 in.	4 in.	6 in.	8 in.	10 in.
Price,	\$0.90	1.35	1.80	2.70	3.60	4.50
Thickness,	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "
Postage,	1c.	2c.	3c.	4c.	6c.	9c.

Our sales in the past have been about equally divided between the Graduated and Hardened Try Squares (Figs. 100 and 101). The Graduated Squares are not as much cheaper than the Hardened, as would seem to be indicated in list prices. Hardened Squares are measured inside of stock; Graduated are measured over all. For example, the four and one-half inch Hardened Square is within one-half inch as long as the six inch Graduated, and there is but little difference in price; other sizes in like proportion. We feel called upon to explain, as we have never seen this fact mentioned elsewhere.

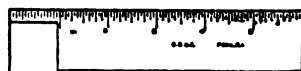


FIG. 100.

GRADUATED, NOT HARDENED.

Size,	3 in.	4 in.	6 in.	9 in.	10 in.
Price,	\$1.80	2.25	3.15	5.40	6.30
Postage,	4c.	7c.	13c.	28c.	

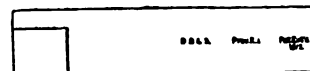


FIG. 101. HARDENED.

Postage.				
1½ in.,	\$1.80	2c.	12 in., \$9.00	
3 "	2.70	6c.	15 "	13.50
4½ "	3.60	12c.	18 "	16.20
6 "	4.50	16c.	24 "	27.00
9 "	6.30	35c.	30 "	36.00

SQUARES.

The Squares shown in Figs. 102 to 109 are of the class usually sold to wood-workers; they are as well made and nicely finished as the price will warrant, and fully equal to any in their class.



FIG. 102. No. 20.

Rosewood stock and graduated steel blade (blued). Is a good common Try Square.

	3 in.	4½	6	7½
	\$0.20	.20	.25	.30
9 in.	10	12	15	18
\$0.35	.40	.45	.60	.85



FIG. 103. No. 12.

A Medium priced Try Square. Has cast iron stock and graduated steel blade.

	4 in.	6	8	10	12
	\$0.22	.25	.35	.40	.50



FIG. 104. No. 10.

Improved Try Square: Has cast iron stock into which rosewood sides are inlaid, making it light and strong.

3 in.	4	6	8	9	10	12
\$0.40	.50	.60	.80	.90	1.10	1.25



FIG. 105. No. 14.

Shows a Try Square with cast iron stock and sliding blade. Very convenient.

	4 in.	6 in.
	\$0.25	\$0.30



FIG. 106. No. 2.

A plain Try and Mitre Square, with rosewood stock and graduated blade.

4½ in.	6 in.	7½ in.	9 in.	12 in.
\$0.38	0.42	0.50	0.60	0.75

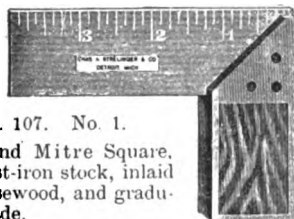


FIG. 107. No. 1.

Try and Mitre Square, with cast-iron stock, inlaid with rosewood, and graduated blade.

4 in.	6 in.	8 in.
\$0.50	0.65	0.75

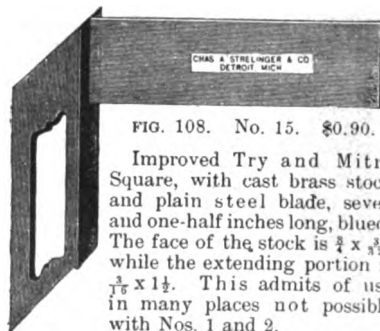


FIG. 108. No. 15. \$0.90.

Improved Try and Mitre Square, with cast brass stock and plain steel blade, seven and one-half inches long, blued. The face of the stock is $2\frac{1}{2} \times 3\frac{1}{2}$, while the extending portion is $1\frac{1}{2} \times 1\frac{1}{2}$. This admits of use in many places not possible with Nos. 1 and 2.

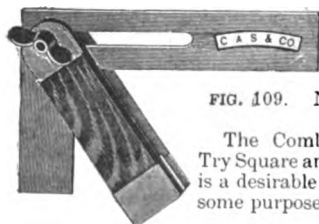


FIG. 109. No. 24.

The Combination Try Square and Bevel is a desirable tool for some purposes.

6 in.	8 in.	10 in.	12 in.
\$0.45	0.55	0.65	0.75

The steel Squares (Fig. 110) have—by reason of improved machinery and increased production—been greatly reduced in price. Our prices on these are about one-half of what they were ten years ago.



FIG. 110.
CARPENTERS'
STEEL SQUARES.

Fig. 110 illustrates the two-foot steel squares described below. They are made with graduations to suit different purposes. Long blades are two inches wide; short blades one and one-half inches wide, and from sixteen to eighteen inches long. The one-foot steel squares are one and one-half inches wide; short blade one inch wide and eight inches long.

The nickel-plating is a slight protection against rusting, but is not, by any means, an absolute prevention.

Polished.		Nickel-Plated.	
No. 14.,	\$0.85 same as No. 13, without brace measure.	No. 114,	\$1.00
" 13,	0.90 $\frac{1}{2}$, $\frac{1}{4}$, 1, with board and "	" 113,	1.05
" 5,	1.00 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, with board and "	" 105,	1.15
" 3,	1.10 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, Essex. "	" 103,	1.25
" 2 $\frac{1}{2}$,	1.20 $\frac{1}{2}$, $\frac{1}{4}$, both sides and edges,	" 102 $\frac{1}{2}$,	1.35
" 2,	1.40 same as No. 1, without 100ths scale,	" 102,	1.55
" 1,	1.50 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, b. & b. meas., 8 sq. and 100ths,	" 101,	1.65
" 100,	2.00 same as No. 1, with addition of $\frac{1}{16}$ and $\frac{1}{32}$,	" 200,	2.15

ONE-FOOT STEEL SQUARES AS FOLLOWS:

No. 10,	\$0.75	two inches wide, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$,	No. 110,	\$0.85
" 11,	0.65	one and one-half inch wide, $\frac{1}{2}$, $\frac{1}{4}$ only, ..	" 111,	0.85
" 12,	0.95	" " " " $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$,	" 112,	1.10

BRIDGE BUILDER'S SQUARE.

No 15, \$6.00 with 18 in. tongue and 1 in. slot in centre, No. 115, \$6 50

MILLWRIGHT'S STEEL SQUARE.

\$9.00.

This Square is designed to meet the wants of parties desiring a more than ordinarily accurate tool of the regular carpenter square type. It is made by Darling, Brown & Sharpe, Providence, R. I.

Long blade is 24 x 2; short blade is 18 x 1 $\frac{1}{2}$.

Both blades are $\frac{1}{8}$ inch thick at the corner where they unite, and taper down to $\frac{1}{16}$ inch at their ends. Both sides are divided to eighths, sixteenths, thirty-seconds and sixty-fourths of inches.

\$0.60. DEVOE'S SQUARE ATTACHMENT. Postage, 3 cts.

This device is used in connection with the steel square by Carpenters, Stair Builders, Cabinet Makers and Woodworkers in general. Fig. 111

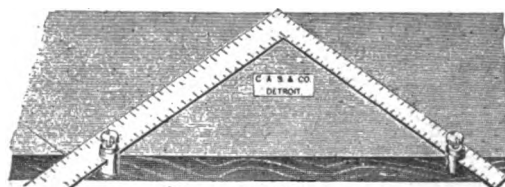


FIG. 112.

shows a side view; Fig. 112 a perspective view, showing same applied for laying out stairs, etc. It can be conveniently used as trammels, with a rule or thin piece of wood. (See Trammel Points elsewhere).



FIG. 111

UNIVERSAL, OR CENTRE SQUARES.

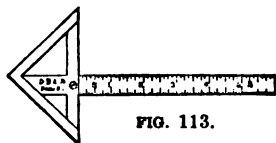


FIG. 113.

Size,	4 in.	6 in.	8 in.	10 in.	12 in.
Price,	\$1.80	2.25	3.15	4.50	5.40
Postage,	3c.	7c.	12c.	19c.	28c.

The Centre Square is used principally in finding the centre of circles, squares, and laying out work on the end of shafts.

UNIVERSAL BEVELS.



FIG. 114. BEVEL.

Fig. 114 is a low-priced tool, and is sold largely to wood-workers. They have rosewood stock and sliding blade, blued.

Size,	6 in.	8 in.	10 in.	12 in.	14 in.
Price,	\$0.25	0.30	0.35	0.40	0.50
Postage,	3c.	4c.	6c.	8c.	10c.



FIG. 115.

This Bevel is of the same class as the one shown in Fig. 114, made with all iron stock and sliding blade.

Size,	6 in.	8 in.	10 in.
Price,	\$0.45	0.50	0.60
Postage,,	7c.	9c.	11c.

Fig. 116 presents a Bevel for Machinists' use. The blade is marked so that a Right, Mitre, Hexagon or Octagon angle may be obtained. Is perfectly made throughout.



FIG. 116.

Size,	6 in.	9 in.	12 in.
Price,	\$1.15	1.35	1.60
Postage.	4c.	9c.	15c.

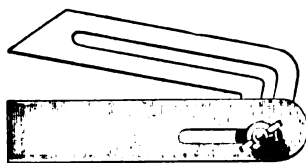


FIG. 117. No. 15. \$1.35. Postage, 2c.

Starrett's Bevel, shown above, is especially desirable for fine work. The offset in the blade is invaluable, as any angle, however slight, may be obtained. It is made in but one size — stock, 3 in. x $\frac{1}{4}$ x $\frac{1}{4}$; blade, 3 in. x $\frac{1}{4}$ x $\frac{1}{4}$. The head of bolt comes flush with stock, so it can be laid flat on drawing.



FIG. 118. \$1.35. long and one-quarter inch Postage, 2c. wide. Thickness of head, three thirty-seconds; of tongue, one thirty-second inch.

BEVEL PROTRACTORS.

There are thirteen different styles of Bevel Protractors made for Machinists' use. We illustrate three styles. They differ materially, as noted in explanation following each cut.

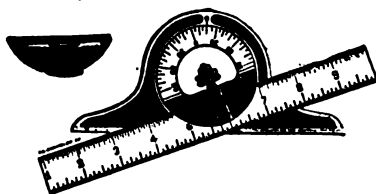


FIG. 119. No. 12.

	Postage.
Head only,	\$1.80 8c.
" with 12 inch blade,	2.70 14c.
" " 18 " "	3.40
" " 24 " "	4.25

Fig. 119 shows a good medium-priced tool; has sliding blade (graduated), firmly held in the swinging disc at any point of length or degree of angle. An auxiliary level is now furnished with this Protractor.

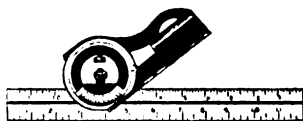
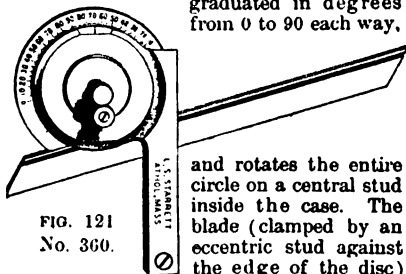


FIG. 120. No. 10.

This differs from Fig. 119 in design, and has the following advantages: The face of stock extends on both sides of blade; this admits of an angle being laid off in opposite directions without changing setting; swinging the blade against a hardened screw (at right angles to the stock) it forms a Try Square; in this position it can be used as a plumb. By folding blade into stock it forms a level.

			Postage.
With 12 inch blade,	\$4.50		.22 cts.
" 18 " "	5.40		.30 "
" 24 " "	6.30		

The Bevel Protractor shown in Fig. 121, weighs six ounces. The blade is seven inches long by one-half inch wide, stock four inches long, and both are made from sheet steel nicely finished. The disc is graduated in degrees from 0 to 90 each way.



and rotates the entire circle on a central stud inside the case. The blade (clamped by an eccentric stud against the edge of the disc)

may be slipped back and forth its full length, or turned at any angle around the circle and firmly clamped at any point, adapting it for work in positions where others cannot be used, and rendering the common universal bevel (for transferring angles) unnecessary. One side of the stock being flat makes it a convenient tool for laying on paper in drafting, etc., and it has double the utility of any other tool of the kind. A twelve inch blade is made to fit this tool and will be sent to order.

		Postage.
Price, with 7 inch blade,	\$4.50	.08 cts.
Morocco case for same,	0.75	.03 "
Price, with 12 inch blade,	5.40	.11 "

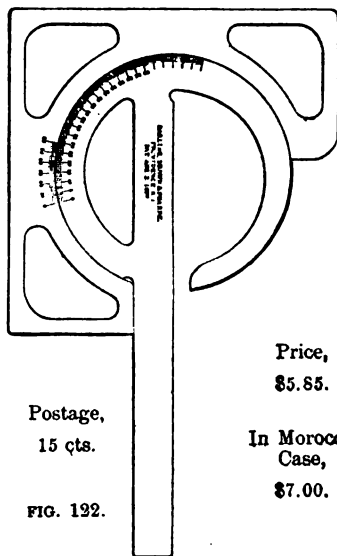


FIG. 122.

The draughtsman's Protractor (Fig. 122) can be quickly set to any angle. It can be used either side up and on either of the two straight edges, and it is of advantage in dividing a circle, transferring angles, or laying off a given angle, without resetting, on either side of a line.

It forms a convenient extension to a T square, and frequently takes the place of 45° and 60° triangle.

TAPERS, PER FOOT, AND THEIR CORRESPONDING ANGLES.

Taper. per ft.	Included Angle. deg. min.	Angle with Centre Line. deg. min.
$\frac{1}{8}$ in.	0 — 36	0 — 18
$\frac{1}{4}$ "	1 — 12	0 — 36
$\frac{3}{8}$ "	1 — 30	0 — 45
$\frac{1}{2}$ "	1 — 47	0 — 53
$\frac{5}{8}$ "	2 — 05	1 — 02
$\frac{3}{4}$ "	2 — 23	1 — 11
$\frac{7}{8}$ "	3 — 35	1 — 47
$1\frac{1}{8}$ "	4 — 28	2 — 14
1 "	4 — 45	2 — 23

The groove and tongue of the Protractor should occasionally be wiped with an oiled cloth, in order that the surfaces may work freely against each other.

Price,
\$5.85.

Postage,
15 cts.

In Morocco
Case,
\$7.00.

STEEL RULES OR SCALES.

Darling, Brown & Sharpe make steel Rules in great variety of graduations (see tables below). We carry them in stock with No. 1 and 4 graduations; also Starrett's and Coffin & Leighton's make, with No. 4 graduation only. We recommend the No. 4 graduation as being the most useful for general purposes.

Starrett's Rules are somewhat lighter than the other makes.

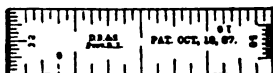


FIG. 123.

All makes are the same price.

1 in., \$0.20	6 in., \$0.65	24 in., \$2.50
2 " 0.25	9 " 1.00	36 " 6.30
3 " 0.35	12 " 1.25	48 " 9.00
4 " 0.45	18 " 2.00	

Postage: 1 to 4 in., 2c.; 6 in., 4c.; 9 in., 6c.; 12 in., 10c.; 18 in., 15c.; 24 in., 20c.

Graduations on rules, in parts of inches, as follows:

	No. 4.	No. 6.	No. 7.	No. 9.
1st Edge to	8	32	16	10 20
2nd " "	16	48	32	16
3rd " "	32	50	64	32 64
4th " "	64	64	100	50 100

	No. 1	No. 2 is divided on 1st edge to 8ths, other edges same as No. 1 graduation.
1st Edge to	14 28	
2nd " "	16 32 64	
3rd " "	12 24 48	
4th " "	10 20 50 100	

Rules longer than twelve inches, with No. 6 or 7 graduation, made to order only.

The No. 5 graduation is divided on first edge to 16, 32 and 64ths of an inch. Second edge, 11, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24 and 25ths. Third edge, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37 and 38ths. Fourth edge, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50 and 100ths. This graduation is made in two lengths only; 12 inch, \$2.70 and 24 inch, \$5.40.

GEAR RULES.

No. 61, \$2.70, is twelve inches long; divided on both sides (whole length) to 16, 20, 22, 24, 26, 28, 30 and 32 parts of an inch.

No. 73, \$2.70, is twelve inches long, divided on both sides (whole length) one

inch of each division, to 6, 7, 8, 9, 10, 11, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36 and 38 parts of an inch.

Starrett's "Flexible" Rules (not shown) are made of a very thin watch-spring steel, nicely tempered; graduated on one side only to 32nds and 64ths, 50ths and 100ths, or 64ths and 100ths of an inch. All sizes to twelve inches long are one-half inch wide, eighteen to twenty-four inches long, three-fourths inch wide. This is an excellent tool for use on irregular surfaces. Prices under Fig. 123.



FIG. 124.

Starrett's Narrow Rule (shown above) is three-sixteenths inch wide, No. 18 gauge spring steel, graduated on one edge of each side only to 32nds and 64ths, 50ths and 100ths, or 64ths and 100ths of an inch. 4 in., \$0.40, 6 in., \$0.60.



FIG. 125. D., B. & S. SQUARE RULE.

3 in., \$0.40 4 in., \$0.55 6 in., \$0.80

GRADUATIONS.

No.	8, 16, 32, 64ths	of an inch,
1	8, 16, 32, 64, 100ths	whole
2	16, 32, 64, 100ths	length.
3	16, 64, 50, 100ths	

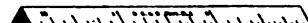


FIG. 126. D., B. & S. TRIANGULAR RULE.

Size,	3 in.	4 in.	6 in.	12 in.
Each,	\$0.45	\$0.65	\$0.90	\$2.25
Postage,	2c.	3c.	4c.	8c.

100 GRADUATIONS.

No. 4, to 16, 64 and 100 parts of an in.
 " 5, to 16, 32 and 64 parts of an in.
 " 6, to 20, 50 and 100 parts of an in.
 " 7, The twelve inch rules are divided to 8, 10, 12, 14, 16, 20, 24, 28, 48, 50, 64 and 100 parts of an inch.

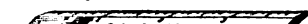


FIG. 127. KEY-SEAT RULE.

With this rule parallel lines can be readily and accurately drawn on Shafts, for laying out Key-ways, Mortises, &c.

4 in., \$2.25 6 in., \$2.70 8 in., \$3.35
 Postage on 4 inch., 4c.; 6 in., 6c.; 8 in., 8c.

Fig. 128 shows Starrett's new Key-seat Rule. The graduated auxiliary blade can be removed and used as an ordinary rule; it will also receive the narrow rule (Fig. 124), making it possible to draw or scribe lines on very small shafts.



FIG. 128.

6 in.	\$2.50 plain.	} with Auxiliary Blade,	Postage. 4 cts.
6 "	2.70 graduated.		4 "
9 "	3.85 "		7 "
9 "	3.35 plain.		7 "



FIG. 129. D., B. & S. CALIPER RULE.

\$1.80. Postage, 2 cts.

This Caliper Rule is an invaluable tool for pocket use. It can be used as a try-square, depth gauge, weight gauge, and a caliper. They are divided in four ways:

(A.) Has No. 2 graduation on outside, except the 8ths. Slide to 32nds and 64ths.

(B.) Same as A, except slide is 64ths and 100ths.

(C.) Regular No. 4 graduation. Slide to 32nds and 64ths.

(D.) Same as C, except slide, which is 64ths and 100ths.

We recommend C, as being the most desirable for general use.

STEEL SHRINK RULES.



FIG. 130.

These rules are Starrett's make, spring-tempered, one inch wide, of eighteen gauge steel, with shrinkage one-eighth inch per foot.

No. 34, 12 in. \$1.80 has No. 2 graduation
" 34, 24 " 3.60 " " 4 "

We can furnish these in No. 4 graduation, Shrink on one side, Standard on the other; also a Flexible Shrink rule, graduated to 32nds and 64ths on one side only.

Price as above.

BOXWOOD SHRINK RULES.

No. 30, graduated to 8ths and 16ths.
Price, \$0.65.

No. 31, same as No. 30, except that it folds to twelve inches. Price, \$0.90.

STEEL STRAIGHT EDGES.

(NOT HARDENED.)



FIG. 131. STARRETT'S.

Length.		Width.	Thick.	Postage.
12 inches	\$1.15	1 inch	$\frac{1}{8}$ "	10 cts.
18 "	1.80	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	16 "
24 "	2.50	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	

DARLING, BROWN & SHARPE'S EDGES.

Length.		Width.	Thick.	Postage.
6 inches	\$0.55	1 inch	$\frac{1}{8}$ "	4 cts.
9 "	0.80	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	0 "
12 "	1.10	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	10 "
18 "	1.60	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	16 "
24 "	2.15	2 "	$\frac{1}{8}$ "	
36 "	5.40	$2\frac{1}{2}$ "	$\frac{1}{8}$ "	
48 "	8.10	3 "	$\frac{1}{8}$ "	

D., B. & S. EDGES.—HARDENED.

Length.		Width.	Thick.	Postage.
$3\frac{1}{2}$ inches	\$0.55	$\frac{1}{2}$ inch	$\frac{1}{8}$ "	2 cts.
$5\frac{1}{2}$ "	0.90	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	3 "
7 "	1.10	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	5 "
$10\frac{1}{2}$ "	1.80	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	14 "
14 "	2.70	2 "	$\frac{1}{8}$ "	22 "
17 "	3.15	$2\frac{1}{2}$ "	$\frac{1}{8}$ "	
20 "	4.05	$2\frac{1}{2}$ "	$\frac{1}{8}$ "	
27 "	6.30	3 "	$\frac{1}{8}$ "	
33 "	8.10	3 "	$\frac{1}{8}$ "	
39 "	10.80	$3\frac{1}{2}$ "	$\frac{1}{8}$ "	

STARRETT'S REVELED STRAIGHT EDGES.

Length.		Width.	Thick.	Postage.
12 inches	\$1.35	1 inch	$\frac{1}{8}$ "	10 cts.
18 "	2.25	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	16 "
24 "	3.15	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	26 "

D., B. & S. BEVELED STRAIGHT EDGES.

Length.		Width.	Thick.	Postage.
12 inches	\$1.80	$1\frac{1}{2}$ inch	$\frac{1}{8}$ "	1/8 cts
18 "	2.70	$1\frac{1}{2}$ "	$\frac{1}{8}$ "	16 "
24 "	3.60	2 "	$\frac{1}{8}$ "	18 "
36 "	8.10	3 "	$\frac{1}{8}$ "	
48 "	10.80	3 "	$\frac{1}{8}$ "	

These are beveled on one edge only to one-sixteenth inch. Are not hardened.

DRAUGHTSMEN'S STEEL STRAIGHT EDGES.

Length.	Width.	Thick.	Price.	Postage.
15 in.	1 1/2	7/8	\$0.80	8 cts.
18 "	1 1/2	7/8	0.90	10 "
24 "	1 1/2	7/8	1.35	16 "
30 "	1 1/2	7/8	2.00	
36 "	2	7/8	2.70	
42 "	2 1/2	7/8	3.60	
48 "	2 1/2	7/8	5.40	
60 "	2 1/2	7/8	7.20	

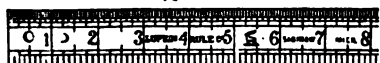


FIG. 132. STEEL RULES.

Three-fourths inch wide, No. 22 gauge; eighths on one side, sixteenths on other, lower edge only. One foot, \$0.30. Two feet, \$0.60.

One and one-fourth inches wide, No. 16 gauge; eighths on lower edge, sixteenths on upper edge, both sides. Two feet, \$0.90. Three feet, \$1.40. Four feet, \$1.75.

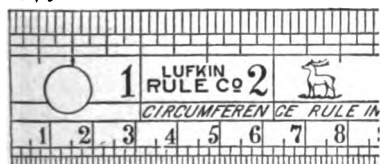


FIG. 133. CIRCUMFERENCE RULE.

This is a very useful tool for obtaining the circumference of circles, by simply measuring the distance. Top edge is graduated sixteenths of inches; bottom edge with "circumference" inches into the eighths. The divisions of this edge, compared with opposite edge, bear the same ratio inversely to each other, as the diameter of a circle to its circumference. Therefore, opposite the first inch on top edge is read, on the lower edge 3, and the fraction representing 0.1416 inches. Its use is appreciated by tinners and all sheet-metal workers, for whom it is peculiarly well adapted. Made in three sizes, 1 1/2 inches wide, No. 16 gauge. Two feet, \$2.00. Three feet, \$2.50. Four feet, \$3.00.

These are made in two styles, the tinners' rule having table of measurements of dry measure, flaring and straight, liquid measure flaring, and cans flat and pitched top.

The Sheet-metal Workers' Rule is divided on opposite sides to eighths and sixteenths of inches.



FIG. 134. CHESTERMAN JOINTED RULE.

This is a rule we sell large numbers of. It is used very extensively by blacksmiths and carriage-makers. Is made of steel, three-fourths inch wide, with stop-joint and brass ends. Price, \$0.75.

We also have the same rule in spring brass, at same price.



FIG. 135. FOLDING STEEL POCKET RULE

These rules are very neat and convenient for light work. Are made of spring steel, and will bend to a three-inch circle. They occupy but little space, and are easily carried in the vest pocket.

No. 31,	\$0.20	1 ft. 3 in. joints,	4 fold.
" 31,	0.45	2 " 3 "	" 8 "
" 41,	0.20	1 " 4 "	" 3 "
" 41,	0.45	2 " 4 "	" 6 "
" 41,	0.75	3 " 4 "	" 9 "
" 41,	1.00	4 " 4 "	" 12 "
" 46,	0.45	2 " 6 "	" 4 "
" 46,	0.75	3 " 6 "	" 6 "
" 46,	1.00	4 " 6 "	" 8 "

We can furnish the above folding steel pocket rules, nicely nickel-plated, at an additional expense of \$0.10, \$0.20, \$0.30 and \$0.40 each for the one, two, three and four feet sizes respectively.

Can also furnish a neat stitched leather case for the one and two feet, at \$0.10 each, three and four feet, at \$0.20 each.

CHESTERMAN STEEL RULE.

Made of tempered steel, quite flexible. Has hole in one end to hang up, and one end round for pocket use. Four and six inch are three-fourths inch wide, No. 21 gauge; the nine and twelve inch, one and three-eighths inch wide, No. 19 gauge. Are divided in eighths, sixteenths, thirty-seconds and sixty-fourths on one side.

Price, \$0.35, \$0.40, \$0.50 and \$0.60 respectively.

BOXWOOD AND IVORY RULES.

We show and price here a selection from our stock of rules. Some of these are peculiarly useful, and are not generally found on sale. Among them are the Slide Rules, Architects' Two feet Caliper, and the German Flexible Rules.

Ivory Rules are desirable for gifts, and where the eyesight is poor, as the black markings on white are more easily read. We do not consider them as reliable as the Boxwood, as they are more apt to shrink. Have seen a first-class Ivory Rule that had shrunk nearly one-eighth of an inch in two feet. However, this class of rule is not often used for close work, and even as extreme a variation as the above (which is of course very uncommon), might not be so serious.

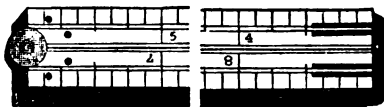


FIG. 136. "ROUND JOINT."

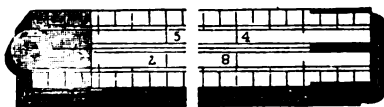
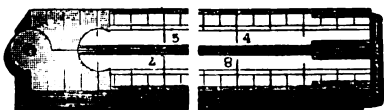
FIG. 137.
"SQUARE JOINT" (with Edge Plates).

FIG. 138. "ARCH JOINT" (full bound).

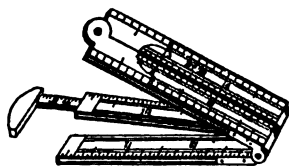


FIG. 139. No. 32. CALIPER RULE.



FIG. 140. No. 40. CALIPER RULE.

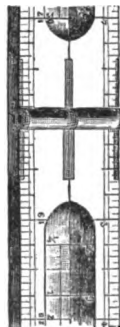
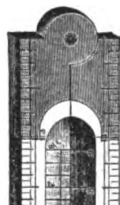
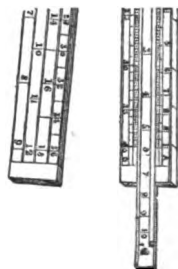
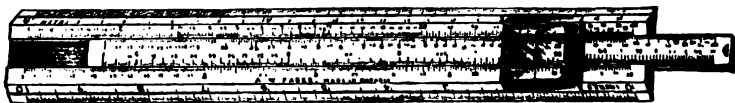
FIG. 141.
ARCHITECTS' RULE.FIG. 142.
SLIDE RULE

FIG. 143. FABER'S SLIDE RULE.



FIG. 144. No. 45. GAUGING ROD.



FIG. 145. No. 37. WANTAGE ROD.

ONE FOOT RULES.

- No. 69, \$0.10. Boxwood, Round Joint.
 " 64, .15. " Square " "
 " 65 $\frac{1}{2}$, .30. " " full Brass bound.
 No. 92, \$0.75. Ivory, Square Joint.
 " 88 $\frac{1}{2}$, 1.00. " Arch Joint.
 " 88, 1.50. " " full German Silver bound.

All of the above are $\frac{1}{2}$ inch wide, and divided into 8ths and 16ths of inches.

TWO FEET, FOUR FOLD.

(Extra narrow, $\frac{1}{4}$ inch wide.)

- No. 61 $\frac{1}{2}$, \$0.30. Boxwood, Square Joint.
 " 62 $\frac{1}{2}$, .40. " " full Brass bound.
 No. 56B, \$3.75. Ivory, Arch Joint, full German Silver bound.

All of the above are divided into 8ths, 10ths, 12ths and 16ths of inches.

TWO FEET, FOUR FOLD (one inch wide).

- No. 68, \$0.10. Boxwood, Round Joint.
 " 68, .15. " Square " "
 " 84, .30. " " Brass bound on outside edge.
 No. 62, \$0.35. Boxwood, Square Joint, full Brass bound.
 No. 51, \$0.20. Boxwood, Arch Joint.
 " 52, .35. " " Brass bound on outside edge.
 No. 60, \$0.55. Boxwood, Double Arch Joint, full Brass bound.
 No. 55, \$2.50. Ivory, Square Joint.
 " 87, 4.00. " Arch " full German Silver bound.

With the exception of No. 68, all of the above are divided into 8ths, 10ths, 12ths and 16ths of inches, and have a simple form of draughting scale.

TWO FEET, FOUR FOLD (Broad).

($1\frac{1}{2}$ inches wide.)

- No. 72, \$0.30. Boxwood, Square Joint.
 " 72 $\frac{1}{2}$, .50. " " full Brass bound.
 No. 78 $\frac{1}{2}$, \$0.65. Boxwood, Double Arch Joint, full Brass bound.

All of the above are divided into 8ths, 10ths and 16ths, and draughting scale.

- No. 83, \$0.45. Boxwood, Arch Joint with slide, 8ths, 12ths and 16ths, 100ths of a foot and octagonal scales.

- No. 82, \$0.65. Boxwood, Arch Joint, full Brass bound, 12ths and 16ths, draughting scales and board measure.

(2)

- No. 95, \$4.75. Ivory, Arch Joint.

" 97, 5.50 " Double Arch Joint.
 Nos. 95 and 97 are full German Silver bound, divided into 8ths, 10ths, 12ths and 16ths of inches, and draughting scales.

TWO FEET, TWO FOLD.

($1\frac{1}{2}$ inches wide.)

- No. 18, \$0.15. Square Joint, 8ths and 16ths.

- No. 4, \$0.35. Arch Joint, 8ths and 16ths, draughting and octagonal scales.

We would especially recommend the No. 4 to those who are in the habit of using a rule of this form. It weighs less than one-half as much as the ordinary style, but on account of its construction, (the plates being on outside of wood) is very much stronger.

CALIPER RULES. (Figs. 139 and 140.)

- No. 13, \$0.30. Boxwood, Two fold, 6 in.
 No. 36 $\frac{1}{2}$, \$0.40. Boxwood, Two fold, 12 inch, 8ths, 10ths, 12ths and 16ths. $1\frac{1}{2}$ inches wide.

- No. 32, \$0.30. Box, Arch Joint, 1 in. wide.
 No. 32 $\frac{1}{2}$, \$0.50. Box, Arch Joint, 1 inch wide, Brass bound.

- Nos. 32 and 32 $\frac{1}{2}$ are Four fold, 12 inch, divided into 8ths, 10ths, 12ths and 16ths.
 No. 38, \$0.75. Ivory, Two fold, 6 inch, $\frac{1}{2}$ inch wide.

- No. 39, \$1.75. Ivory, Four fold, 12 inch, $\frac{1}{2}$ inch wide.

- No. 40, \$2.30. Ivory, Four fold, 12 inch, $\frac{1}{2}$ in. wide, full German Silver bound.

- No. 830, \$1.50. Boxwood, Four fold, 2 ft.
 This rule we have made especially for us, and we sell great numbers of them. Will caliper stock up to two inches in diameter.

ARCHITECTS' RULES.

This is a style of rule that has been used for a great many years in England, and has only come into general use in this country the past few years. It is exceedingly useful for architects, builders, and all those who handle drawings that are laid out in fractional scale. The rule when closed is in appearance the same as an ordinary folding pocket rule, and can be used as such. The draughting scales are on inner edge of inside (see Fig. 141).
 No. 53 $\frac{1}{2}$, \$0.50. Boxwood, Arch Joint, 1 inch wide, divided into 8ths, 10ths, 12ths and 16ths of inches, and the beveled edges into architects' scales of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch to the foot.

No. 13 $\frac{1}{2}$, \$0.50. Same as No. 53 $\frac{1}{2}$, but $\frac{1}{2}$ inch wide.

No. 28 $\frac{1}{2}$, \$0.60. Same as No. 53 $\frac{1}{2}$, but $\frac{1}{4}$ inch wide.

No. 86 $\frac{1}{2}$, \$5.00. Ivory, Arch Joint, with German Silver Edge Plates (not bound), 1 inch wide. Same style and graduation as No. 53 $\frac{1}{2}$.

The following are the same general style; imported English make, and of finer quality:

No. 1119, \$1.50. Brass, Arch Joint and Edge Plates (not bound), $1\frac{1}{2}$ inch wide; outside of rule divided into 8ths, 10ths, 12ths and 16ths of inches. Inside bevel edges graduated to architects' scales of $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 and 1 inch to the foot. Angles of 45, 60 and 90 degrees on joint.

No. 1123, \$3.00. Boxwood, Arch Joint, German Silver mounted, $1\frac{1}{2}$ inch wide, divided on outside into 8ths, 10ths, 12ths and 16ths of inches, with 16 architects' scales on inside, from $\frac{1}{16}$ to 3 inches to the foot. Degrees marked on joint.

No. 1289, \$7.50. Same as No. 1123, but choice Ivory, with German Silver mountings.

MISCELLANEOUS RULES.

No. 58, \$0.50. Boxwood, 3 feet, 6 fold, Arch Joint, divided into 8ths, 10ths, 12ths and 16ths.

No. 58 $\frac{1}{2}$, \$1.25. Same as No. 58, but full Brass bound.

No. 60, \$4.25. Ivory, otherwise same as No. 58.

No. 60B, \$5.00. Ivory, same as No. 60, but full German Silver bound.

All of the above are $\frac{1}{2}$ inch wide.

No. 66 $\frac{1}{2}$, \$0.35. Boxwood, 3 feet, 4 fold, Arch Joints, 1 inch wide.

No. 94, \$1.75. Boxwood, Carriage-makers' Rule, 4 feet, 4 fold, Arch Joint, full Brass bound, $1\frac{1}{2}$ inch wide.

No. 42, \$0.20. Boxwood, Ship-carpenters' Bevel, double tongue.

No. 41, \$0.25. Yard Stick, Brass tipped.

" 50, 0.35. " " Hickory caps.

" 45, 0.60. Gauging Rod (Fig. 144).

" 37, 0.65. Wantage Rod (Fig. 145).

These rods, or rules, are used to ascertain the capacity of a barrel; the wantage rod is used in connection with the gauging rod. The No. 44 has 12 tables, for barrels of 16 to 120 gallons capacity.

Stephens' Combination Rule, \$2.00.

Boxwood, 1 foot, 2 fold. This combines in itself a Rule, Spirit Level, Plumb, Square, Bevel, Indicator, Brace Scale, Draughting Scale of equal parts, T Square, Protractor and Right Angle Triangle.

SLIDE RULES.* (Fig. 143).

These Rules are very largely used by the most intelligent class of engineers, architects, scientists, designers of machinery, surveyors, and intelligent mechanics generally.

They are also particularly adapted to the use of persons having charge of Cotton or Woollen machinery. The quickness and ease with which different calculations can be made, is little short of marvelous.

No. 12, \$0.50. Boxwood, Arch Joint, Gunter's Slide, divided into 8ths, 10ths and 16ths of inches; draughting and octagonal scales, $1\frac{1}{2}$ inches wide.

No. 15, \$0.85. Same as No. 12, but full Brass bound.

No. 6, \$0.65. Boxwood, Arch Joint, Gunter's Slide, for Engineering, divided into 8ths, 10ths and 16ths of inches; octagonal scale $1\frac{1}{2}$ inches wide.

No. 16, \$1.00. Same as No. 6, but full Brass bound.

We have an improved treatise on the Gunter's Slide and Engineers' Rules, showing their utility, and containing full and complete instructions; 300 pages, bound in cloth. Price, \$1.00.

Faber's improved Calculating Scale (Fig. 143). Price, with book of instructions, \$3.60. This Calculating Scale, or Mathematical Rule, is made of boxwood, is $10\frac{1}{2}$ inches long, and has a traversing slide of nicked metal.

Keuffel & Esser's Slide Rule. Price, with directions, \$4.50. Is similar to the above, but is divided on celluloid facings. Can furnish this in 20 inch size; price, \$16.50. The 20 inch size has an advantage, in that they admit of finer divisions and consequent closer readings.

No. 1740, \$30.00. Thatcher's Calculating Instrument, performs the greatest variety of useful calculations, with unexampled rapidity and accuracy. Cylinder, 18 inches long, in polished mahogany box.

No. 1741, \$40.00. Same as No. 1740, but with 3 inch Reading Glass sliding on brass bar, and adjustable.

* The prices of all pocket rules on pages 37 and 38 include postage.



FIG. 146. FLEXIBLE FOLDING RULE.

These pocket rules are, to a great extent, taking the place of the ordinary two foot rule. They are made from two to six feet long, machine-divided and accurate. As they are made of very thin wood, the divisions can be brought close to the object measured. They have spring joints, which hold rule in a straight line when open.

Perhaps their greatest advantage, however, is in their extreme lightness, the two foot rule weighing but one ounce.

Prices are: 3 ft., \$0.40; 3 ft., \$0.60; 4 ft., \$0.75; 6 ft., \$1.25.

HICKORY, BOARD AND LOG RULES.

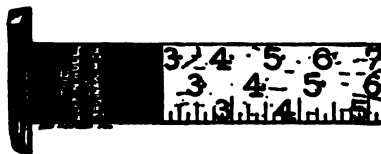


FIG. 147. THREE TIER BOARD RULE.



FIG. 148. FIVE TIER BOARD RULE.

These are made of the best second growth hickory, hand shaved, Figures are burned on the wood.

The log rules are furnished regularly with the Doyle or Scribner scale of measurements, but we can furnish any other scale that may be wanted.

No. 1,	\$1.75.	3 Tier,	3½ ft.,	Brazed Head.
" 2,	1.60.	3 "	3 "	" "
" 2½	1.50.	2 "	2½ "	" "
" 4	1.35.	3 "	3 "	Socket "
" 6	1.75.	3 "	3 "	Brass Plate.
" 8	1.60.	4 "	3 "	Brazed Head.
" 10	2.00.	5 "	3 "	" "
" 13½	2.00.	4 "	3½ "	Board and Log rule combined; Brazed Head.

LOG RULES.

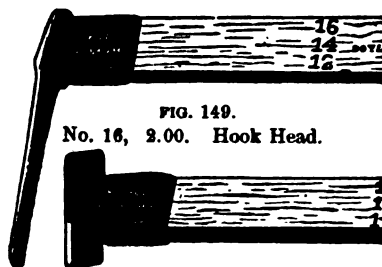


FIG. 149.

No. 16, 2.00. Hook Head.

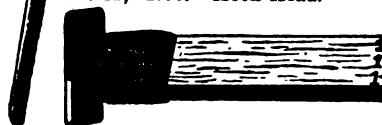


FIG. 150.

No. 14, \$2.00. Square Head.

Can furnish Log rules for any diameter or length measurements desired.

For all special rules an extra price will be charged.



FIG. 151. STEEL BOARD RULE.

No. 51,	\$2.80.	3 Tier,	3½ ft.,	Inspector's.
" 52,	2.40.	3 "	3 "	Board.
" 58,	2.60.	3 "	4 "	" "

The Steel Board rule, Fig. 151, has been in use for some time, and is giving excellent satisfaction. It is nearly as light as a wooden rule, weighing less than sixteen ounces. Is nickel plated and lacquered to prevent rusting.



FIG. 152. LUMBER GAUGE.

\$0.50.

A neat device, worn on the finger, for determining the thickness of lumber. Can be carried in vest pocket.



FIG. 153. IMPROVED MARKING STICK.

\$1.00.

This is adapted to lumber crayons of standard makes; is 36 inches long, with hickory handle.

MEASURING TAPES.

In one of our earlier catalogues we made this statement: "Our Tape Lines are all warranted accurate." That was a good many years ago, and we know more about tapes now than we did then.

All woven tapes, whether cotton lines, or metallic warp, are liable to shrink or stretch. The idea generally prevails that the warp in metallic tapes consists of fine brass or copper wires, but this is not the case; it is tinsel wound on fine cotton thread. For accurate measurements, nothing but steel tapes can be depended upon. Owing to the nature of material used, care should be taken to avoid short kinks in the steel tapes.

While the Chesterman (imported) steel and metallic tapes have in the past been the best known, there are now several American makers; among them Lufkin Rule Co., Keuffel & Esser, Geo. M. Eddy, and Justus Roe, who are making some very nice goods.

Our Steel Tapes are all warranted accurate, and while we describe and price the line of those most generally sold, we can furnish steel tapes in almost endless variety as regards width, length, style of reel or case, and graduation. For many purposes the lower priced tapes are well adapted.



FIG. 154.

STEEL POCKET TAPES, SPRING, GERMAN SILVER CASE.

Length, 3 ft.	5 ft.	6 ft.	9 ft.	12 ft.
Each, \$1.10	1.35	1.50	2.10	2.75
Postage, .02	.03	.04	.05	.06

The twelve foot tape is five-sixteenths, the other sizes one-quarter inch wide.

We can furnish the steel pocket tapes same as Fig. 154, but marked both sides; U. S. Standard on one side and Metrical on the other. The extra cost on three, five and six foot sizes is ten cents, and nine and twelve foot sizes twenty cents.

We can also furnish a Spring Measuring Tape in nickel-plated case, quite similar in style, but with a linen tape that is three-eighths inch wide. This is a very

desirable article, and is preferred by many to the steel pocket tape. We have them in three sizes; six, eight and fifteen feet, and the prices are \$0.95, \$1.10 and \$1.50 respectively.



FIG. 155. STEEL TAPE.

\$4.00.

This is in solid German silver case, folding flush handle, made in but one size, twenty-five feet, five-sixteenths wide; is preferred by many on account of small size—two and one-eighth inch diameter, and light weight. It is a beautiful article, and we sell many of them to be used as gifts.

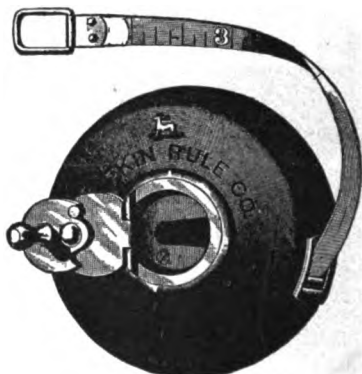


FIG. 156. STEEL MEASURING TAPE.

Length, 25 ft. 50 ft. 66 ft. 75 ft. 100 ft.
Each, \$3.85 6.10 7.85 8.85 11.00

Marked feet and 12ths (inches and eighths) or 10ths and 100ths of feet for surveyors' use.

With double-folding flush handle, opened by pressing small pin or button on opposite side. Hard leather case, nickel-plated trimmings. Tapes are three-eighths-inch wide.

Can furnish with nickel-plated tapes at an advance of \$1.00, 1.50, 1.75, and 2.00 respectively.

We can also supply, if desired, the Chesterman and nearly any other make of tape, at same price as above.



FIG. 157.

The Stevens' Tape (Fig. 157) is one-half inch wide, on patent brass frame, with patent folding handle. It is used largely by Surveyors, and is considered advantageous by many, on account of the open frame, rendering it more easily dried and kept free from rust.

It is made in but two sizes: 50 feet, price, \$7.50; 100 feet, price, \$13.00.



FIG. 158. RIVAL STEEL TAPE.

Length,	25 ft.	50 ft.	75 ft.	100 ft.
Each,	\$3.25	\$4.00	\$5.25	\$6.75

The "Rival" Tape is offered to meet the demand from Contractors, Builders, Masons and others, who appreciate the value of a steel measuring tape, and who do not feel inclined to invest in the higher-priced article. While it is sold at a comparatively low price, none of its practical features have been sacrificed. The measurements are as accurate as in our high-priced goods, and are guaranteed. The tape itself is made of a lower-priced steel, of American production, but of good quality, and is marked only on one side in feet, inches and eighths. The case is of brass, nicely nickel plated, and is compact and durable. The handle

folds nearly flush with the case. We can safely recommend this tape to the purchaser as an article that with care will outlast any number of linen, or so-called Metallic Warp Tapes, and its measurements can always be depended upon.

CHESTERMAN METALLIC TAPE.

This is the Standard, and the best of woven tapes. It has a metallic warp running through, is strong and durable, divided in tenths or twelfths, as desired. Length, 25 ft. 50 ft. 66 ft. 75 ft. 100 ft. Each, \$1.75 2.35 2.70 3.00 3.90

BENT LEATHER CASE TAPES.

Has heavy Holland tape, five-eighths inch wide.

Length,	50 ft.	66 ft.	75 ft.	100 ft.
Each,	\$1.35	\$1.45	\$1.50	\$1.75

PATENT LEATHER CASE TAPES.

Good quality linen tape, one-half inch wide.

Length,	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
Each,	\$0.75	\$0.90	\$1.10	\$1.30	\$1.40

ENAMELED CASE TAPES.

These Tapes are the cheapest made, and, although largely sold, are only adapted to the most ordinary work.

Length,	25 ft.	50 ft.	66 ft.	75 ft.	100 ft.
Each,	\$0.35	.55	.65	.75	.90

CHESTERMAN LAND CHAINS.

Made of the best steel wire, hardened, tempered and Japanned, with three oval rings, brass swivel, handles and tallies. Divided into feet and tallied at every ten feet.

		Price, each.	
		Brazed.	Not brazed.
No. 61,	No. 12, 50	\$4.50	\$3.00
" 61,	" 12, 100	8.60	5.60
" 1017,	" 10, 50	4.90	3.40
" 1017,	" 10, 100	9.40	6.40

We also have the No. 62, made of No. 8 gauge iron wire, in fifty and one hundred feet lengths. Price, \$2.10 and \$3.20 respectively.

**PATENT IMPROVED
ADJUSTABLE LEVELS AND PLUMBS.**
From 26 to 38 inches in length.



FIG. 159. STANLEY LEVEL.

- No. 2, \$0.90. Brass side views.
 " 3, 1.00. Plain " " Brass tipped
 " 4, 1.25. Lipped " " "
 " 5, 1.55. 3 piece cherry " "
 " 10, 2.00. 2 " mahogany " "
 " 11, 3.35. Rosewood, " "

Nos. 5, 10 and 11 have ornamental Brass
lipped side views. See Fig. 159.

No. 85, \$1.35. Mason's Level and Plumb.
Adjustable, also arranged for plumb
bob and line, is 42 inches long by 3½
inches wide.



FIG. 160. COOK'S LEVEL.

- No. 4, \$2.45. Solid cherry.
 " 1, 2.70. " mahogany.
 " 5, 2.70. Three-piece cherry.
 " 2, 3.15. " mahogany.

Cook's Patent Adjustable Levels shown
in Fig. 160 differ from others in import-
ant particulars:

1st. The bulb tubes carrying the bulbs
are set in a frame and faced on both sides
with glass.

2d. The bulbs can be seen ten feet
away, and at any position.

3d. Can be used under or over the ob-
ject to be leveled.

It is made in the best manner and fin-
ish, every one thoroughly tested and fully
warranted.



FIG. 161. STRATTON'S LEVEL.

- | | | | | |
|-----------|--------|--------|--------|--------|
| Length, | 6½ in. | 8 in. | 10 in. | 12 in. |
| Rosewood, | \$1.10 | 1.80 | 2.15 | 2.85 |
| Length, | 24 in. | 28 in. | 30 in. | |
| Mahogany, | \$4.40 | 4.65 | 4.90 | |
| Rosewood, | 6.30 | 6.85 | 7.20 | |

Stratton's Levels, Fig. 161, furnished in
rosewood or mahogany, specially selected.

All edges are brass bound throughout.
Have ornamental tipped side views and
heavy end plates.

The 6½ inch Level has no plumb.



FIG. 162. TRANSIT.

This Transit was especially designed for
Builders and Architects, who often re-
quire a level and an instrument to obtain
angles, but do not feel like paying the
price of an engineers' transit.

The Instrument is
composed of iron and
brass, and consists of
a tripod, to which the
head is connected by
ball and socket-joint on upper plate, which
can be leveled by the leveling screws.
This plate is recessed to contain a gradu-
ated arc for taking angles. On this plate
rests a triangular frame, to which is at-
tached a level, a graduated arc for taking
vertical angles and a sight tube. The
plain sight tube has no lenses, is brass,
twelve inches long; in one end is a small
eye aperture, in the other the usual cross
wires.

This telescope has cross lines, adjust-
able to distances, same size and length of
plain sight tube.

The instrument, as shown in Fig. 162,
is eight inches high. With extension
legs that fasten on over the short ones,
the height can be from two feet eight
inches to four feet eight in-
ches.

Sight tube,
level case, and
graduated arcs are nickel plated, other
parts are japanned.

With Plain sight tube, \$15.00; with
Telescope sight tube, \$26.50. Add for
Extension legs, \$1.50; for Ground vial,
\$1.50. Compass, 2 inch diam., \$5.00;
Target, to go on 10 foot pole, \$1.50.

Weight, when packed, about 15 lbs.

Fig. 163 shows the best and most durable Leveling Instrument in the market for the money. Adapted for use of Architects, Carpenters, Builders, Stone masons and others, for leveling, obtaining angles, etc. This instrument consists of a tripod, to the head of which is connected an upper plate carrying a graduated arc and a level with telescope sights.

Will forward upon application, circulars giving complete description of the Transit and Leveling Instrument.*

PRICES.

With plain glass in level, \$12.50
 " ground glass in level, 14.00

Weights 13½ pounds when packed for shipment.

Directions sent with instrument.

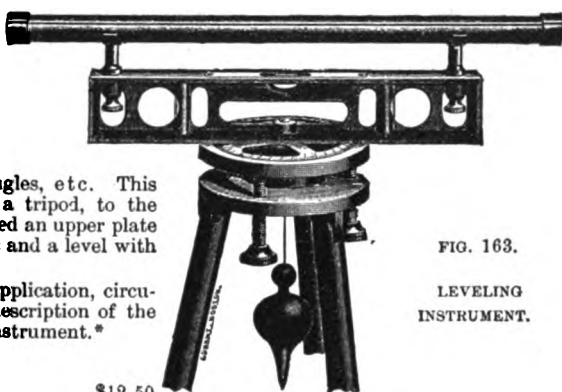


FIG. 163.

LEVELING
INSTRUMENT.

FIG. 166.

We illustrate in Fig. 166, an extra-fine Level, with ground vial, which makes it very sensitive. A handsome tool in design, with nickel-plated tube, Japanned base and fine adjustment.

4 inch, has ground vial, \$2.00
 6 " " " " and handle, 3.15
 8 " " " " " " " 3.60

Postage: 4 inch, 3c.; 6 inch, 10c.; 8 inch, 16c.

BESIDES:

In issuing this Catalogue, it has not been our intention to illustrate, price and describe all goods that we have in stock. Our general line is too large to think of even attempting to cover it, in the space which a work of this size contains.

Our lines of Wood Workers' Tools and Supplies, and Shelf and Builders' Hardware, are as complete and quite as large as the lines represented here.

While we have made the greatest effort to have this Book, as far as possible, "Up to date," there are changes constantly being made, and new goods coming into the market all the time.

We solicit correspondence relating to any of the above mentioned lines, and hold ourselves at the service of our patrons.



FIG. 164.

The Pocket Level (Fig. 164) is a most convenient tool for many purposes. Of hexagon shape and nickel plated.

2½ inch Pocket Level,	\$0.34	1 ct.
3½ " " "	0.68	2 "



FIG. 165. RICHARDSON LEVEL.

The Richardson Iron Level is a well made tool and we think the best iron level in the market. We warrant them to be accurate and free from any imperfections.

6 inch Double Plumb,	\$1.35	12 cts.
12 " " "	1.60	18 "
18 " " "	1.80	24 "
24 " " "	2.00	

*We are selling agents for the Keuffel & Esser Company, who make a complete line of improved Surveying Instruments, including Architects' Levels, Engineers' and Architects' Y Levels, Engineers' Transits, Mountain and Mining Transits, ranging in prices from \$45.00 upwards.

These goods have been modernized and improved in many ways, and we offer them as being superior in every respect. Will send full descriptive circulars upon application.



FIG. 167. DAVIS INCLINOMETER.



FIG. 168. No. 1354. BRASS LEVEL.



FIG. 169. No. 1628. ROSEWOOD.



FIG. 170. No. 1330. ROSEWOOD.



FIG. 171. No. 1348. ROSEWOOD.



FIG. 172. RAILROAD TRACK LEVEL.

The Davis Level, Plumb and Inclinometer (Fig. 167) is an exceedingly useful and convenient tool for many purposes. It takes the place, in many cases, of the expensive Clinometers, and is as good as can be furnished at the price.

Length,	6 in.	12 in.	18 in.	24 in.
Price,	\$2.00	\$2.50	\$3.00	\$3.50

IMPORTED ENGLISH LEVELS.

These Levels, shown in Figs. 168 to 171, represent a class of levels such as is not made in this country. They are beautiful goods, and we sell quantities of them across our counter.

Fig. 168, No. 1354, 6 inch, \$1.50, 9 inch, \$2.25, is used extensively by Machinists on fine work. The base is of heavy brass, to which is fixed a brass tube, containing a vial one-half its length. The bulb is much longer than in other levels, making it so sensitive that a variation of the thickness of tissue paper is perceptible.

No. 1356, 9 inch, \$2.75, 12 inch, \$3.50, is the same as above, but provided with a revolving tube, to protect the glass when not in use. Nos. 1354 and 1356 are both adjustable, and put up in neat cases.

Fig. 169, No. 1628, 9 inch, \$1.50, 12 inch, \$2.00, is a very light and pretty

rosewood level and plumb, with brass trimmings.

Fig. 170, No. 1330, 9 inch, \$1.65, 12 inch, \$2.75, rosewood level, brass plate on top and brass ends on bottom.

Fig. 171, No. 1348, 9 inch, \$1.75, 12 inch, \$2.50, rosewood level and plumb, brass plate on top.

The Railroad Track Level (Fig. 172) is reliable and accurate. Edges fully protected by iron. The leveling appliance, when not in use, is protected by discs, as shown in cut. Glass can be seen from either side ten or fifteen feet distant. Price, \$3.00.

We have the same style Level without steps, for Street Roads. Price, \$2.75.

Ordinary Level Glasses, all lengths, from 1½ to 4 inches. Price, 10 cts. each. Extra fine Ground Level Glasses are used largely by Engineers and Millwrights. They are accurate and sensitive.

Length,	1½ in.	1½ in.	2 in.	2½ in.	3 in.
Price,	\$0.90	\$0.90	\$1.25	\$1.50	\$1.65
Length,	3½ in.	4 in.	4½ in.	5 in.	
Price,	\$2.00	\$2.25	\$2.50	\$2.75	

Architects' or Builders' Level, Fig. 173, has a telescope eleven inches long, with dust shade and cross-hairs, fine divided bubble; object-glass with rack-movement, eyepiece adjustable. Horizontal circle, 3 inches, divided to degrees with Vernier reading to 5 minutes. A most serviceable and compact instrument.

The Level comes complete with metal trivet, plumb bob and adjusting pins; is put up in polished hard-wood box, and furnished with hard-wood tripod.

We can furnish an architect's rod, hard-wood, brass mounted, with Target Vernier and Clamp, divided in inches and eighths, $5\frac{1}{2}$ ft. sliding out to $10\frac{1}{2}$ ft. Price, \$6.00.

Architects' Level, No. 5003, is the same as above, but provided with a compass, divided to degrees, fine needle. Price, \$50.00.

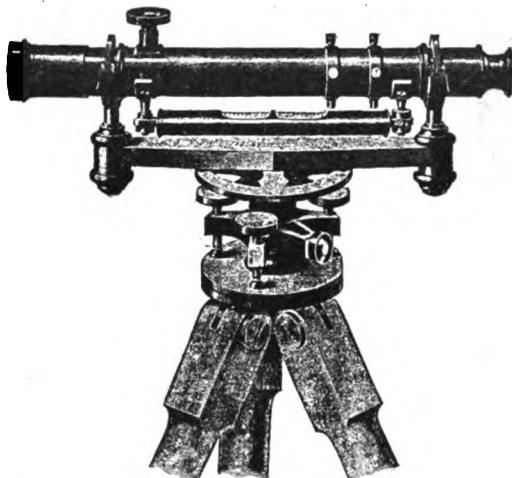


FIG. 173.

No. 5000. ARCHITECTS' LEVEL. \$45.00.

picked up and carried to the light, if necessary, and the exact position of the water located on the scales. Any length of hose desired may be used between the gauges and accurate levels taken over any distance the hose will permit.

No. 1 is suitable for leveling on machinery, shafting, etc., and shows a variation from level line of $3\frac{1}{4}$ inches and can be used with 25 feet of hose. Price, \$10.00, including 12 feet of tube, one coupling and case. Extra tubing 10 cts. per foot.

No. 2 is same as above, except larger, showing a variation of 6 inches, and can be used with 100 feet of hose. Price, \$15.00, including 25 feet of tube, one coupling and case. Extra tube 15 cents per foot.

These levels are each put up in a hard-wood Lock Box, which is included in the price given above.

To prevent freezing, add about 10 per cent of glycerine with the water before filling the level.

There is no annoyance from overflow or loss of the liquid in using. If the stop-cocks should be left open, little float-valves located in the cups close the vent holes automatically when the water rises to the top of the gauges.



FIG. 174. HYDROSTATIC LEVEL.

In lining up shaftings, finding levels at long distances, over obstructions or around corners, more can be accomplished in one hour with this instrument than can be done in a day with an ordinary spirit level. It not only tells that points are out of level, but shows, in inches and fractions of an inch, how much they are out of level. Any workman can use it. Accurate for all distances.

DIRECTIONS.

When leveling two points a gauge is placed on each, the stop-cocks are opened, and when the water comes to rest, closed again, thus confining it to the exact height indicated. The instrument may then be

SCREW DRIVERS.

In olden times, and not so very olden either, when a man wanted a first-class screw driver, he took a used-up file and either hammered, or ground it into shape. And, unless he happened to be a very particular fellow, the file marks were very evident when it was finished. The majority of screw drivers sold in the stores, at that time, were very indifferent as regards quality, but now-a-days, there are a good many first-class screw drivers made, and sold (and a good many bad ones).

With the exception of the Stanley Screw Driver (Fig. 175), which is a well finished tool, of fair quality, all of the Screw Drivers shown, described and priced in this catalogue are of superior quality. They are made by the most reliable manufacturers, of the best materials and are handsomely finished. Nearly all sizes of Screw Drivers may be sent by mail. See list at bottom of this page.

Stanley's Screw Driver (Fig. 175) is a low-priced tool, about of the quality usually sold in hardware stores.



FIG. 175.	FIG. 176.		FIG. 177.		FIG. 178.		FIG. 179.	FIG. 180.		FIG. 181.
Size,	2 in.	3 in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in.	18 in.	24 in.
Fig. 175,	\$0.08	\$0.10	\$0.12	\$0.15	\$0.20	\$0.30				
" 176,	.20	.20	.25	.30	.35	.45	\$0.50	\$0.75		
" 177,	.20	.20	.25	.30	.35	.45	.50	.75		
" 178,	.25	.25	.35	.40	.45	.50	.60	.75		
" 179,	All sizes 50 cents each.									
" 180,		.75	.85	.95	1.00	1.20	1.40	1.50		
" 181,		.30	.35	.40	.50	.65	.80	.95	\$1.50	\$2.00
Postage,	.03	.02	.03	.04	.05	.08	.12	.17		

Fig. 175, has polished Beech handle; Figs. 176, 177 and 180, Ebony handles; Figs. 178 and 179, polished Rosewood handles, and Fig. 181, Beech, Mahogany finish.

The Piano Screw Driver (Fig. 178) blades are made of forged (Stubs') steel, are from 2 to 12 inches long and from $\frac{1}{4}$ to $\frac{3}{4}$ inch diameter respectively, making them light, but strong. They have octagon rosewood handles, thereby giving the hand a firm grip on the tool.

Thayer's Screw Drivers (Figs. 176 and 177) are of excellent quality. We recommend them as being good, strong, serviceable tools.

Billings & Spencer's Screw Driver (Fig. 179) is a handsome tool, especially desirable, on account of its strength, as compared with its length, being from six to seven inches long over all. The blades of these measure, in their respective sizes, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{1}{2}$ inch in width.

Often when a screw-driver is used, some tool is needed to make a hole for the screw. The square Reamer, on the reverse end of the driver, shown in Fig. 182, is useful for that purpose.

Can be instantly changed end for end. They are made of first quality tool steel, carefully tempered and nicely finished, and have cocobola handles.

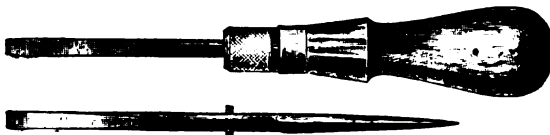


FIG. 182. DUPLEX SCREWDRIVER. \$0.50. Postage, 8c.



FIG. 183.

The Clock Screw Driver (Fig. 183) has obtained a very large sale with us for light electrical work. It is seven inches long over all, and is furnished in three styles of handles.

With cherry handle,	\$0.25
“ rosewood handle,	0.30
“ ebony “	0.35
Postage on each, 3 cents.	

Clark's Screw Driver Sets (Fig. 184) are so well known that an extended description is unnecessary here. Upwards of four hundred thousand sets of these have been sold.

The bits can also be used in an ordinary brace. The handle can be used for turning a bit in a corner.

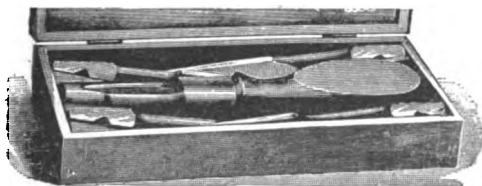


FIG. 184.

These drivers will turn the heaviest screws.

In maple box, 4 bits, assorted,	\$1.00	Postage, 19c.
“ paper “ 3 “ “	0.85	“ 12c.

The Millers Falls Ratchet Screw Driver Set, shown in Fig. 185, is the same general style as Clark's.

The Bits, when in handle are $3\frac{1}{4}$, $5\frac{1}{4}$ and $7\frac{1}{4}$ inches long. The handle measures seven inches over all.

Can be used either as a plain, or as a Right and Left Ratchet driver.

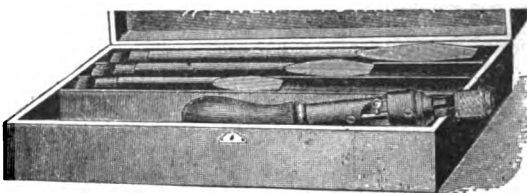


FIG. 185. \$1.60. Postage, 15 cents.



FIG. 186. ALLARD'S SPIRAL SCREW DRIVER.

\$1.50. Postage, 12 cents.

These drivers class among the most wonderful labor-saving tools ever invented. This method of driving small and medium sized screws is an entire revolution. It saves fully two-thirds of the time, as it will drive screws in either soft or hard wood in one-third of the time taken by an ordinary screw driver.

It is operated simply by pushing on the handle. The "Reid's Lightning Brace," shown elsewhere, is also excellently well adapted for this purpose.

Caution.—Be sure and oil often; there is great friction, and they will last twice as long if kept properly oiled.



FIG. 187. HOWARD-ALLARD SPIRAL SCREW DRIVER.

With 3 bits, \$1.35. Postage, 15 cents.

The Howard-Allard Driver, Fig. 187, is a new tool. It can be used either as a spiral, ratchet or ordinary screw driver. Is perhaps better for general purposes than the Allard; but for simply driving large quantities of screws, we believe

the Allard would prove the most serviceable.

There are four or five other makes of this class of screw driver, but we think the two kinds shown here are superior to any of the others.



FIG. 188. Jewelers' driver, \$0.20.



FIG. 189. Extra quality Screw Driver Bit, \$0.20; extra heavy, \$0.25.



FIG. 190. Forked driver, \$0.25.



FIG. 191. Piano, 5 inch, \$0.20, 8 inch, \$0.30.

INQUIRIES.—We have endeavored throughout this book, to answer a great many of the inquiries commonly received by us, but we wish it understood that we are at the service of our patrons and will cheerfully give any information that lies

in our power to obtain. In this connection, we wish to say, that questions asked by our customers are sometimes overlooked. We do not mean to be careless, and if any inquiries are not answered, we ask that they be kindly repeated.

SCREW OR MONKEY WRENCHES.

Some one has written, "Of the making of many Books there is no end." This same may be said of Wrenches. Scarcely a month passes that our attention is not called to new kinds, and it is an unusual number of the Patent Office Gazette that does not show from one to three.* The "fad" for the past few years has been a "quick adjusting" wrench. All we have seen of these are constructed with ratchets, gears or springs; have examined and quite thoroughly tested a number of them, but up to the present time have not found any that we consider desirable, most of them being impractical and lacking durability.

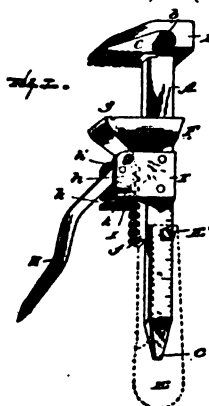
A great deal of ingenuity has been expended (and lots of it wasted) in the devising of wrenches.

In number of patents they crowd washing machines, car couplers and bicycles, but are still a long way behind electrical patents.

The following is a copy of a patent issued from the U. S. Patent Office, September, 1892. There are two quite broad claims, but we give only the first, which ought to be "broad" enough to suit any one, and shows considerable talent on the part of both Patent Attorney and Inventor.

No. 483,461 WRENCH (patentee's name and address).

Serial No. 435,483 (no model).



Claim 1. A combination tool embodying in the one device a nut-wrench, a pipe-wrench, a hammer formed by the fixed jaw of the wrench, a nail puller formed on the movable jaw, a screw-driver, and a rule formed on the shank of the fixed jaw of the wrench, a wire-cutter, calipers, nut-cracker and a try-square, all constructed

and arranged relatively to each other as set forth.

We beg leave to insert here a few "Idle Thoughts" in regard to the Patent business. Many mechanics have greatly inflated ideas about the values of patents, and as soon as a new idea is conceived the average inventor hastily applies for a patent, whereas, if a little time and judgment were used in ascertaining what other similar articles had been patented or were in the market, it would result in the saving of countless hard-earned dollars.

There lies on our desk a wooden model of a wrench, the history of which furnishes an example of what we have here stated. It was "invented" and patented quite recently by an engineer in Texas, who came north for the purpose of having it manufactured. Some one directed him to us, and it was not a pleasant task to be obliged to inform him as to how utterly valueless both the wrench and patent were. After an inspection of our "Hard Stock" collection, he was easily convinced. He happened to be quite a philosophical sort of fellow, and left the model with us, remarking, "If I had seen you before I saw the Patent lawyer, I'd have been two hundred dollars better off. I'm not 'in it' in the Wrench business."

Our old friend, Mr. D. W. Simpson, writes, "I have come to the conclusion that all this trouble might be remedied if the inventors (so called) would learn early in the game—as they are surely apt to, later on—that a patent is generally a high-toned invitation, on parchment, to attend a first-class lawsuit." (Simpson is a bit of a pessimist.)

While we do not at all consider ourselves as "experts," an experience of nearly twenty-five years, combined with a great interest in all that relates to Tools and Machinery, has given us a fair stock of knowledge in what appertains to these lines, and we will gladly furnish any information we are able to command, to any one desiring it, and trust that we may be of use in this direction to our customers.

"In order to verify what might seem 'snap-judgment,' we took (at random) the bound volume of Patent Office Reports for July, August and September, 1892, and found that in eleven weeks there had been twenty-two patents issued for wrenches.



FIG. 192. COES' KNIFE-HANDLE.

Size,	6 in.	8 in.	10 in.	12 in.
Price, black,	\$0.45	\$0.50	\$0.65	\$0.80
" polished,	0.50	0.60	0.75	0.95
Will open	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$2\frac{1}{4}$ in.

Size,	15 in.	18 in.	24 in.
Price, black,	1.25	1.60	2.00
" polished,	1.45	1.85	2.30
Will open	$2\frac{1}{2}$ in.	3 in.	$4\frac{1}{4}$ in.

The Coes' Knife-handle Wrench (Fig. 192) is the most popular high-grade wrench made, and, while there are a dozen or more good makes of wrenches, we believe there are more "Coes'" sold than of all the others combined.

Observe that the bright wrench costs but little more than the black, and for obvious reasons, is better.

The Merrick (Fig. 193) is a light wrench, but strong, made of best materials and handsomely finished.



FIG. 193. MERRICK'S.

Size,	8 in.	10 in.	12 in.	15 in.	18 in.
Price,	\$0.75	\$0.95	\$1.10	\$1.75	\$2.15
Will open	$1\frac{1}{4}$ in.	$1\frac{1}{2}$ in.	$2\frac{1}{4}$ in.	$2\frac{3}{4}$ in.	4 in.

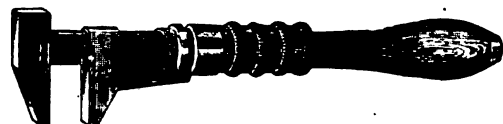


FIG. 194. BRIGGS'

Size,	8 in.	10 in.	12 in.	15 in.	18 in.
Price,	\$0.95	\$1.25	\$1.40	\$2.25	\$2.75
Will open	$1\frac{1}{4}$ in.	$2\frac{1}{4}$ in.	$2\frac{3}{4}$ in.	$2\frac{3}{4}$ in.	4 in.



FIG. 195. STARR.

Size,	6 in.	8 in.	10 in.	12 in.	15 in.
Price,	\$0.25	\$0.30	\$0.35	\$0.45	\$0.75

The Briggs' (Fig. 194) has the Long Nut, or Sleeve, whereby more power is obtained in the jaw; will be found essential in screwing up and unscrewing square and hexagon nuts, where the corners are worn off. For out-of-doors work in cold weather, it can be adjusted with glove or mitten on, to much better advantage than any other wrench. The Long Nut, or Sleeve, also protects and prevents the screw from getting damaged. The Briggs and Merrick wrenches are great favorites among Engineers and Machinists, and we think they are the best made.

The Starr (Fig. 195) is an imitation of the old style Coes' wrenches. It is what is commonly known as an "Agricultural" Wrench, we presume, from the fact that it is the kind of wrench that the implement manufacturers give away with threshing machines and corn shellers. The less said about quality the better. It is just the wrench for the man who expects to "lose it," or "have it stolen."

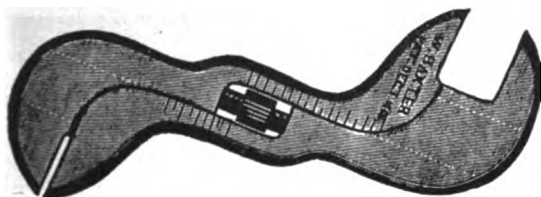


FIG. 196. BAXTER'S "S" WRENCH.

Size, 4 in.	6 in.	8 in.	10 in.
Price, \$0.40	.60	.80	1.20



FIG. 197. BAXTER'S DIAGONAL.

Size, 6 in.	8 in.	10 in.
Price, \$0.60	.80	1.20



FIG. 198.

B. & C. IMPROVED ADJUSTABLE "S" WRENCH.

Size, 8 in.	10 in.	12 in.	14 in.
Price, \$0.70	.90	1.15	1.45
Opens, 1 in.	1½ in.	1½ in.	2 in.



FIG. 199.

BILLINGS & SPENCER STEEL WRENCH.

Size, 4 in.	5 in.	6 in.
Price, Black, \$0.54	\$0.74	\$0.90
" Nickerled, .74	.84	1.15
Postage, .08	.11	.20

The Baxter's Wrench, Fig. 196, is a very useful tool where spaces are narrow and contracted. The 4 inch size is desirable as a pocket wrench.

The Baxter Diagonal, Fig. 197, is similar to the "S" wrench, but is a little more easy to adjust. Since the expiration of patent, a few years since, others have made them, but the original manufacturers (Greene, Tweed & Co.) make—we believe—the best wrench of this type.

The B. & C. Improved Adjustable "S" Wrench, Fig. 198, is adapted from an old English pattern, and is a most excellent tool. It takes the place in many cases of the "Baxter" and "Diagonal," which it excels in every respect, save one advantage the others have in being thinner. It has several advantages over any other wrench of this class heretofore made.

They are not as yet made in 4 and 6 inch sizes, but ought to—and doubtless will be at some time in the future.

The Billings & Spencer, Fig. 199, is drop-forged from bar steel, finished in a thorough manner, and case hardened. The 4 inch is the most popular Bicycle wrench ever made, and the larger sizes are just as desirable in their way.

NOTE.—Our line of Pipe Wrenches are shown elsewhere in connection with Pipe Fitting Tools.

SOLID STEEL WRENCHES.

The great advances made in drop-forging during the past few years, enable us to offer a surprising variety of solid steel wrenches (Figs. 200 to 203 inclusive), at very reasonable prices. Our sales have increased tenfold within the past year or two. Where sizes of bolts, nuts or screws are positive or fixed, the solid wrench is infinitely superior to the adjustable; they are stronger, lighter, and do not bruise or mar finished work. How many hundreds of times have we seen adjusting screws of various kinds rendered useless by constant slipping of the loose-fitting adjustable wrench!

Another feature of advantage is that they are much more likely found at hand when needed, as they

are not nearly as useful to the "borrowing fiend."

They are made in almost infinite variety of size and style. Those shown and priced here are selected as being the most generally useful, but we can furnish almost any desired size.

The opening forms an angle of fifteen degrees with the handle, which admits of turning a hexagon nut completely around where the swing of the handle is limited to thirty degrees. The finished wrenches are polished, case-hardened, and milled to fit U. S. Standard finished nuts.



FIG. 200.

Unfinished	No.	Finished.	Standard U. S. Nut.	Opening Unfinished.	Extreme Length.	Opening Finished.	Thickness at Head.
\$0.09	0	\$0.18	$\frac{1}{8}$	$\frac{1}{8}$	2 $\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$
0.10	1	0.20	$\frac{1}{4}$	$\frac{1}{4}$	3 $\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$
0.12	2	0.24	$\frac{3}{8}$	$\frac{3}{8}$	4 $\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$
0.14	3	0.25	$\frac{1}{2}$	$\frac{1}{2}$	5 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
0.15	4	0.30	$\frac{5}{8}$	$\frac{5}{8}$	6 $\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$
0.18	5	0.35	$\frac{3}{4}$	$\frac{3}{4}$	7 $\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
0.22	6	0.45	$\frac{7}{8}$	$\frac{7}{8}$	8 $\frac{1}{2}$	$\frac{7}{8}$	$\frac{7}{8}$
0.30	7	0.60	1	1 $\frac{1}{8}$	9 $\frac{1}{2}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
0.35	8	0.75	1 $\frac{1}{4}$	1 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$
0.45	9	0.90	1 $\frac{1}{2}$	1 $\frac{1}{2}$	13	1 $\frac{1}{2}$	1 $\frac{1}{2}$
0.60	10	1.20	1 $\frac{3}{4}$	1 $\frac{3}{4}$	14 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
0.75	11	1.50	2	2	16 $\frac{1}{2}$	2	2
1.00	12	2.00	2 $\frac{1}{4}$	2 $\frac{1}{4}$	18 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
1.60	14	3.15	2 $\frac{3}{4}$	2 $\frac{3}{4}$	22 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$
2.25	16	4.50	3	3	25 $\frac{1}{2}$	3	3
3.15	17	6.30	3 $\frac{1}{2}$	3 $\frac{1}{2}$	29 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$

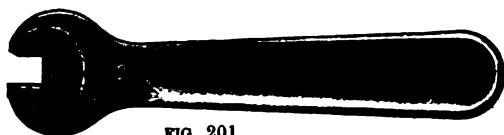


FIG. 201.

The Single Head Set Screw Wrenches, as shown in Fig. 201, have concave handles and admit of milling the unfinished ones, to one or two sizes larger.

Unfinished.	No.	Finished.	Fits Std Set Screws.	Extreme Length.	Thickness Head.
\$0.10	93	\$0.20	$\frac{1}{8}$	3 $\frac{1}{2}$	$\frac{1}{8}$
0.12	94	0.24	$\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{1}{4}$
0.15	95	0.30	$\frac{3}{8}$	5 $\frac{1}{2}$	$\frac{3}{8}$
0.20	96	0.40	$\frac{1}{2}$	6 $\frac{1}{2}$	$\frac{1}{2}$
0.25	97	0.60	$\frac{5}{8}$	7	$\frac{5}{8}$
0.30	99	0.60	$\frac{3}{4}$	8	$\frac{3}{4}$
0.35	100	0.70	$\frac{7}{8}$	9 $\frac{1}{2}$	$\frac{7}{8}$



FIG. 202. FOR HEXAGON NUTS.



FIG. 203. FOR SET SCREWS.



FIG. 204. TRACK WRENCH. PRICES ON NEXT PAGE.



FIG. 205. TOOL POST WRENCH. PRICES ON NEXT PAGE.



FIG. 206. BOX WRENCH. PRICES ON NEXT PAGE.

PRICES FOR STYLE OF FIG. 202.

Unfinished.	No.	Finished.	Fits U. S. Standard Nuts	Extreme Length.	Thickness of Head.	Openings Unfinished.	Openings Finished.
\$0.14	22	\$0.28	$\frac{1}{2}$ & $\frac{1}{2}$	4 in.	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{1}{2}$
.15	23	.30	$\frac{3}{4}$ " " "	4 " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
.20	26	.40	$\frac{1}{2}$ " " "	5 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
.23	28	.42	$\frac{3}{4}$ " " "	6 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
.28	30	.50	$\frac{1}{2}$ " " "	7 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
.34	32	.62	$\frac{3}{4}$ " " "	8 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
.40	34	.75	$\frac{1}{2}$ " " "	9 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
.50	37	1.00	$\frac{3}{4}$ " " "	11 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
.60	39	1.20	$\frac{1}{2}$ " " "	13 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
.70	40	1.40	$\frac{3}{4}$ " " "	15 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
.90	42	1.89	$\frac{1}{2}$ " " "	17 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
1.15	44	2.30	1 " " "	19 $\frac{1}{2}$ " "	1 " " "	1 " " "	1 " " "
1.50	46	3.00	$\frac{1}{2}$ " " "	21 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
1.90	48	3.80	$\frac{3}{4}$ " " "	23 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
2.40	50	4.80	1 " " "	25 $\frac{1}{2}$ " "	1 " " "	1 " " "	1 " " "
3.00	52	6.00	$\frac{1}{2}$ " " "	27 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "	$\frac{1}{2}$ " " "
4.10	55	8.20	$\frac{3}{4}$ " " "	30 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "	$\frac{3}{4}$ " " "
5.85	57	10.70	1 " " "	34 $\frac{1}{2}$ " "	1 " " "	1 " " "	1 " " "

PRICES FOR STYLE OF FIG. 203.

Unfinished.	No.	Finished.	Fits U. S. Standard Set Screws	Extreme Length	Thickness of Head.
\$0.13	65	\$0.26	$\frac{1}{2}$ & $\frac{1}{2}$	3 $\frac{1}{2}$ in.	$\frac{1}{2}$ & $\frac{1}{2}$
.13	67	.30	$\frac{3}{4}$ " " "	4 " "	$\frac{3}{4}$ " " "
.18	69	.36	$\frac{1}{2}$ " " "	5 " "	$\frac{1}{2}$ " " "
.22	71	.44	$\frac{3}{4}$ " " "	5 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "
.27	73	.54	$\frac{1}{2}$ " " "	6 $\frac{1}{2}$ " "	$\frac{1}{2}$ " " "
.33	75	.66	$\frac{3}{4}$ " " "	7 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "
.48	79	.96	$\frac{1}{2}$ " " "	10 " "	$\frac{1}{2}$ " " "
.58	81	1.16	$\frac{3}{4}$ " " "	11 $\frac{1}{2}$ " "	$\frac{3}{4}$ " " "

[4]

The openings of the Double Head Set Screw Wrenches, Fig. 203, form an angle of 22 $\frac{1}{2}$ degrees with the handle.

Prices will be furnished for wrenches of any desired size or shape, upon receipt of samples or models.



FIG. 207. TRACK WRENCH.
(See Fig. 204. Double-Head.)

All these wrenches have concave handles and are furnished unfinished only.

No.	Each.	Style.	Outside Diameter of Nuts.	Openings.	Extreme Length.	Thickness Heads.
173	\$0.60	Single-Head,	1 $\frac{1}{8}$	1 $\frac{1}{2}$	23	$\frac{1}{2}$
174	.60	" "	1 $\frac{1}{4}$	1 $\frac{1}{8}$	23	$\frac{1}{2}$
175	.60	" "	1 $\frac{1}{2}$	1 $\frac{1}{8}$	23	$\frac{1}{2}$
176	.60	" "	1 $\frac{3}{4}$	1 $\frac{1}{8}$	23	$\frac{1}{2}$
182	.90	Double "	1 $\frac{1}{8}$ & 1 $\frac{1}{2}$	1 $\frac{1}{8}$ & 1 $\frac{1}{4}$	24	$\frac{1}{2}$
184	.90	" "	1 $\frac{1}{4}$ & 1 $\frac{1}{2}$	1 $\frac{1}{8}$ & 1 $\frac{1}{4}$	24	$\frac{1}{2}$
186	.90	" "	1 $\frac{1}{2}$ & 1 $\frac{1}{4}$	1 $\frac{1}{8}$ & 1 $\frac{1}{4}$	24	$\frac{1}{2}$
188	.90	" "	1 $\frac{3}{4}$ & 1 $\frac{1}{2}$	1 $\frac{1}{8}$ & 1 $\frac{1}{4}$	24	$\frac{1}{2}$

TOOL POST WRENCHES.

(See Fig. 205.) Unfinished only.

No.	Each.	Open End Fits U. S. Std Nuts.	Closed End Fits Set-Screws.	Extreme Length.
124	\$0.30	$\frac{1}{2}$	$\frac{1}{8}$	6 $\frac{1}{2}$
129	.35	$\frac{1}{4}$	$\frac{1}{8}$	7
131	.35	$\frac{1}{4}$	$\frac{1}{8}$	7
132	.35	$\frac{1}{4}$	$\frac{1}{8}$	7
139	.40	$\frac{1}{4}$	$\frac{1}{8}$	7 $\frac{1}{2}$
140	.45	$\frac{1}{4}$	$\frac{1}{8}$	8
143	.55	$\frac{1}{4}$	$\frac{1}{8}$	9

SINGLE-HEAD BOX WRENCHES.

(See Fig. 206.) Unfinished only.

No.	Each.	Fits Set-Screws.	Extreme Length.	Thickness Head.
108	\$0 10	$\frac{1}{2}$	3 $\frac{1}{2}$	$\frac{3}{4}$
109	.11	$\frac{1}{4}$	3 $\frac{1}{2}$	$\frac{1}{2}$
110	.13	$\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{1}{2}$
111	.16	$\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{1}{2}$
112	.19	$\frac{1}{4}$	5 $\frac{1}{2}$	$\frac{1}{2}$
113	.22	$\frac{1}{4}$	6 $\frac{1}{2}$	$\frac{1}{2}$
114	.26	$\frac{1}{4}$	7	$\frac{1}{2}$
115	.30	$\frac{1}{4}$	8	$\frac{1}{2}$
116	.36	$\frac{1}{4}$	9	$\frac{1}{2}$
117	.44	1	10	$\frac{1}{2}$

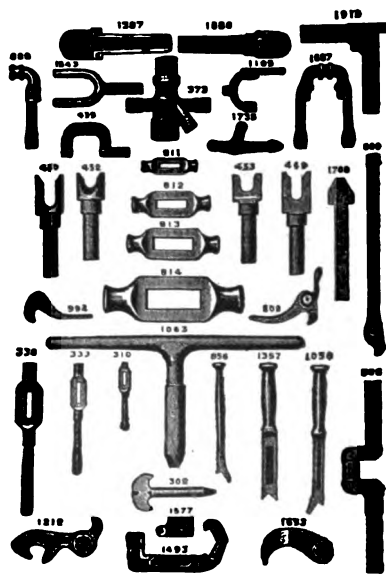


FIG. 209. DROP FORGINGS.



FIG. 208.

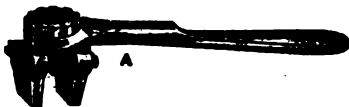
DOUBLE-HEAD BOX WRENCH.

The wrenches shown in Fig. 208 are made in one length only (9 inches). The openings at one end measure $\frac{1}{2}$ inch; other end, 1 inch, short distance. Are furnished unfinished only; each, 45 cts.

Drop Forgings are in many cases taking the place of both regular forgings and malleable castings; they excel either of these in every respect. Oftimes there is a great saving in the cost of finishing, as compared with the others. We illustrate above, examples of different styles and shapes of Drop-forgings, and will be pleased to furnish estimates upon this class of work.

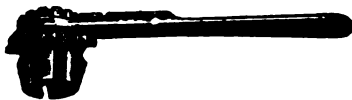
KEYSTONE RATCHET WRENCHES.

This line of Ratchet Wrenches is comparatively new, and is meeting with considerable favor. They are made from fine quality drop-forged steel, handsomely finished and nickel plated. Are easily and readily adjusted, and can be instantly reversed, by simply throwing over the lever in slot of the handle. They are admirably adapted to the use of engineers, electricians, plumbers and gas fitters, millwrights, implement manufacturers, carriage makers, etc., etc.

**FIG. 210. SQUARE JAW.**

No. 1, \$3.15. Length, 9 inches. The jaws open from $\frac{1}{2}$ to $1\frac{1}{2}$ inches.

No. 5, \$5.00. Length, 12 inches. The jaws open from $\frac{1}{2}$ to 2 inches (this is a much heavier and stronger tool than No. 1).

**FIG. 211. ROUND JAW.**

No. 2, \$2.15. Length, 9 inches. The jaws open from $\frac{1}{2}$ to $1\frac{1}{2}$ inches.

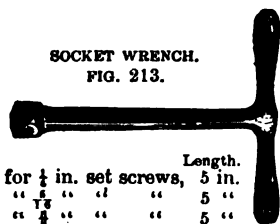
No. 6, \$5.00. Length, 12 inches. The jaws open from $\frac{1}{2}$ to 3 inches.

We can also furnish these with a great variety of attachments, such as Sockets for Drills, Screw Driver, Bits and Reamers. Complete price list sent upon application.

**FIG. 212. LIGHTNING NUT WRENCH.**

For square and hexagon nuts these wrenches are very efficient in putting on and taking off nuts in carriage work, and have become almost indispensable. The shanks are made hollow, and nuts may be rapidly tapped by putting a machine tap in the vise and running nuts on with them.

For $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch nuts, 25 cts. each.

**SOCKET WRENCH.
FIG. 213.**

		Length.
A,	\$0.25, for $\frac{1}{4}$ in. set screws,	5 in.
B,	.25, " $\frac{3}{8}$ " " "	5 "
C,	.25, " $\frac{1}{2}$ " " "	5 "
		Length.
D,	25, " { $\frac{1}{4}$ inch set screws, " square caps, Nut for $\frac{1}{4}$ in. bolt, }	5 in.
E,	25, " { $\frac{3}{8}$ inch set screws, " square caps, Nut for $\frac{1}{2}$ in. bolt, }	5 in.
9	30, " { $\frac{1}{2}$ inch set screws, " square caps, Nut for $\frac{3}{4}$ in. bolt, }	9 in.
3	35, " { $\frac{3}{4}$ inch set screws, " square caps, Nut for $\frac{1}{2}$ in. bolt, }	9 $\frac{1}{2}$ in
10	25, " { $\frac{1}{4}$ in. hexagon caps, " nuts, }	6 in.
11	25, " { $\frac{3}{8}$ " " caps, }	6 in.
12	30, " { $\frac{1}{2}$ " " caps, }	8 in.
13	30, " { $\frac{3}{4}$ " " nuts, }	9 $\frac{1}{2}$ in
14	35, " { $\frac{1}{2}$ " " caps, " nuts, }	10 in

**FIG. 214. RIM WRENCH. \$1.50 each.**

For taking off and putting on nuts in an awkward place inside carriage felloes, this tool will make rapid work of what is usually a tedious job with an S-wrench.

No workman with any regard for his time will fail to use this tool, which will soon earn its moderate cost in any shop, small or large. It is made light, handy and strong, adapted for use on nuts $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ inch.

**** There is a certain species of machinist who makes mistakes—always and continuously. His ten feet four inches and a quarter is an eighth short or long. His inch and a half is in the neighborhood only, of an inch and a half. He forgets the washer on this job, and don't cut the thread up far enough on that one. He drills this hole too far from the edge of a flange, and drills that tap hole the size of the outside of the tap, and he never gets a hole the right size for a tap, and he never chucks a job true enough, and he sets a lathe over, so as to turn a crowning pulley very much more tapering on one side than on the other; he won't make a key bear on the sides, and no wrench will fit all around on the bolt head he files up; he taps holes crooked and runs pipe taps in too deep; he cuts shoulders up a sixteenth too far, and makes the driving fit on the wrong part of the job; he is a good workman for all these things are nicely done. He simply forgets or neglects, or something or other, and is a nuisance, for you never can depend on him. When he lays a job down, you never can have the assurance that it is right until you measure everything about it. The work that such a man does costs lots of money, because you must provide a special supervision over every thing he does. Such a man will turn a foreman's hair gray if he lets him keep on. He never will get any better as long as he works in the same position. To cure this man, reduce his pay and put him at the very foot of the ladder, telling him to raise his own pay by learning to be "sure." No man continually liable to small mistakes around me, if you please.

**** Another man is awfully cautious, careful and sure. It is painful to watch him. He calipers a fit, turns his work nearly to size, hesitates, doubts, and goes through the whole calipering process again. When done he will ache for a chance to try his work to see how it will fit. He measures everything twice and then isn't sure about it. These anxious men are never sure of anything. The more pains they take to assure themselves, the less sure they are. They have no confidence in themselves. No decision, no boldness. The thing grows on

them, and they grope their way through life. When this man locks up his tool box at night he must always go back and put the key in the lock to see whether he locked it or not.

**** Another kind of a chip is the man who never becomes so preoccupied with a thing that he doubts details. He is a man of bold and decided action. He has self confidence enhanced by self confidence. Watch him caliper a job. He knocks his inside calipers with a motion that means something. They move an inch blow. The last hard blow is lighter, but decisive. Then come the gentle strokes, soft and delicate, but effective. Finally, he gets the fit, and when he does he leaves instant. He has got all he came after. He goes to his lathe and sets his inside calipers, and when he gets them right he stops trying to see if they are right; he knows they are. Then he tries the job in the lathe. Good deal to come off. He gives the crank a pronounced turn and takes a big cut over the job. Does he hold his calipers in his hand, and think about the fit in the mean time? Not a bit of it. He starts his new cut, tries his calipers, and sees that he has the right size; lays the calipers down, and lets her go. His mind is now free. He don't wonder if his job is the size of his outsides; he don't wonder if his outsides are the size of his insides; he don't wonder if the insides are the size of the hole; he don't wonder if the "feel" in the hole was just about right; he don't wonder about anything. He *knows* what he has done. He will follow up his job with his calipers, and keep the thing turning straight, and, when done, he will lay the job aside, and don't care a cent who the first man is to try his work together. He don't know what relief is, because he don't know what anxiety is. There is no luck, or ill-luck in the universe for him. A man who makes caliper fits with confidence holds the universe in his hands, and shapes his future with effective strokes. When he raises a sledge hammer he hits where he intends to. He don't wonder where that hammer is coming down.

**** From Chordal's Letters in *The American Machinist*.

PLIERS AND NIPPERS.

New Style.



FIG. 215. FLAT NOSE PLIER.

Size,	4½ in.	5½ in.	6½ in.	7½ in.
Price,	\$0.50	.65	.85	1.10



FIG. 216. ROUND NOSE PLIER.

Size,	4½ in.	5½ in.	6½ in.
Price,	\$0.50	.65	.85

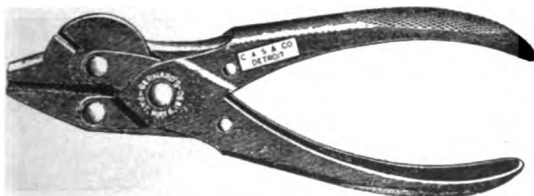


FIG. 217. CUTTING PLIER.

Size,	4½ in.	5½ in.	6½ in.	7½ in.
Price,	\$0.85	1.00	1.25	1.75

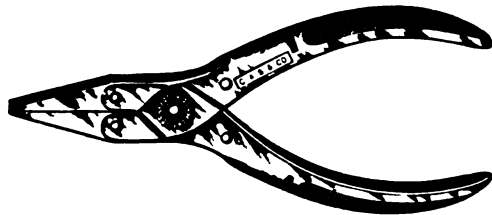


FIG. 218. JEWELERS' FLAT NOSE.

Size,	3½ in.	4 in.	4½ in.	5 in.
Price,	\$0.60	.65	.75	.80

Jewelers' Round Nose, size, 4½ in., price, \$0.75.
Jewelers' Cutting Plier, size, 5 in., price, \$1.20.

The Bernard parallel pliers are comparatively new, having been on the market but a few years. No tool that we know of has met with greater favor and more general sale. There have been a number of different styles of Parallel pliers, but none of them seemed to "fill the bill" until the Bernard was brought out. For many—in fact for most purposes, a plier with parallel jaws is very desirable.

Fig. 215 shows this plier, holding a piece of wire which runs right through between the handles.

The Bernard combination, or cutting, plier, Fig. 217 will cut larger wire with less expenditure of strength than any cutting plier or nipper that we know of.

The regular line of Pliers are uncommonly heavy and strong.

The Bernard Jewelers' pliers are a new line just brought out. They are similar in style to the regular goods, but considerably lighter and are handsomely finished and nickel plated.

The cost of mailing any size of Jewelers' pliers is about five cents. The regular 5½ and 6½ in. can be mailed for ten cents postage, and the 7½ in., which is an extra heavy tool, can be sent by mail for twenty cents.

PLIERS AND NIPPERS.

In presenting the following line of Pliers and Nippers, we desire to explain that all of the goods in this line, shown, described, and priced here, are of the medium and best grades only. We do not mean to carry in stock or sell any of the inferior and cheap lines.



FIG. 219. No. 120. FLAT NOSE.

The Flat Nose Plier, Fig. 219, is a steel plier well made, and polished bright.

Size,	3 in.	3½ in.	4 in.	4½ in.
Price,	\$0.25	.25	.25	.25
Size,	5 in.	6 in.	7 in.	8 in.
Price,	\$0.30	.40	.55	.65

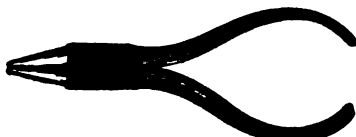


FIG. 220. No. 120. ROUND NOSE.

These are the same in style, sizes and prices as the Flat Nose, Fig. 219.



FIG. 221. No. 119. LONG FLAT NOSE.

Same style and quality as above.

Size,	3½ in.	4 in.	4½ in.	5 in.	6 in.
Price,	\$0.35	.35	.35	.40	.60

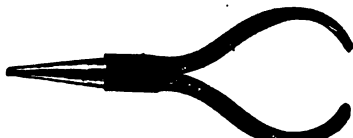


FIG. 222. No. 119. LONG ROUND NOSE.

These are the same in style, sizes and prices as the Long Flat Nose, Fig. 221.

P. S. Stubs makes a plier, called a Pendulum plier, similar to Fig. 221, but with

longer jaws. They are very desirable on account of their extreme length and narrow jaws, for getting into difficult and narrow recesses.

Size,	3½ in.	4 in.	4½ in.	5 in.	6 in.
Price,	\$0.50	.50	.50	.55	.55

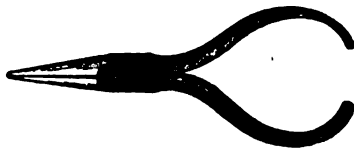


FIG. 223. CHAIN PLIERS.

This plier has long oval points, and serves for many purposes.

Size,	4 in.	4½ in.	5 in.	6 in.
Price,	\$0.40	.50	.55	.65

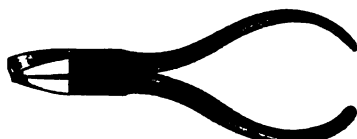


FIG. 224. UMBRELLA PLIERS.

This is a Flat Nose Plier with wide jaws. The 6 inch, measures ½ inch across the jaws, other sizes in proportion.

Size,	5 in.	6 in.	7 in.
Price,	\$0.60	.90	1.15

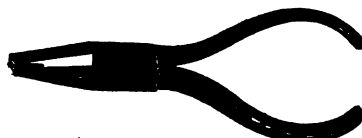


FIG. 225. GLASS PLIERS.

These are used for nipping, or breaking off, plate glass.

Size,	6 in.	7 in.	8 in.
Price,	\$1.00	1.25	1.50



FIG. 226. BUTTONS' PLIERS.

The Buttons' Patent Combined Wire Cutters and Pliers are made by J. M. King & Co., and are very useful tools for general purposes.

4½ in.	\$0.50.	cuts wire up to No. 14.
6 "	0.60,	" " " " 11.
8 "	0.75,	" " " " 8.
10 "	1.00,	" " " " 6.

ODD PLIERS.

Besides our regular line of Pliers, we can furnish if desired, a great variety of odd and special styles and shapes of Pliers, a few of which are illustrated here.

Among these are:

Weaver, or Stockinger Pliers, Fig. 227; Side Cutting Pliers with Flat Cutters, Fig. 228; Patent Bottling Pliers; Long Nose Bell Hangers' Pliers, Fig. 229; Half Round Pliers, Fig. 230; Hawk Bill Pliers, Fig. 231, and Webbing Pliers.

This last is a Plier used largely by furniture manufacturers and saddlers. It is about 8 inches long over all, the jaws are from 2 to 3 inches in width.

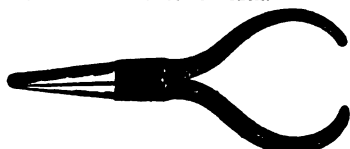


FIG. 227. WEAVER OR STOCKINGER.

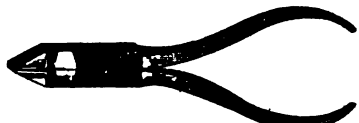


FIG. 228. SIDE CUTTING.



FIG. 229. LONG NOSE BELLHANGERS'.



FIG. 230. HALF ROUND.

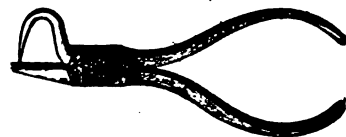


FIG. 231. HAWK BILL.

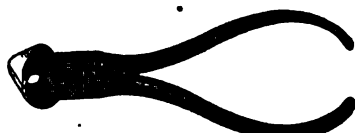


FIG. 232. NO. 110 END CUTTING NIPPERS.

This is a good quality nipper, nicely finished, polished bright.

Sizes, 3 to 4 in. 4½ in. 5 in. 6 in.
Prices, \$0.50 .55 .65 .75

P. S. Stubbs' End-cutting nippers, same style as above, black finish.

Sizes, 4 to 5 in. 6 in. 7 in. 8 in.
Prices, \$0.90 1.20 1.60 2.10

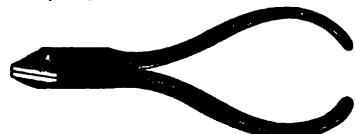


FIG. 233. NO. 110 DIAGONAL OR SIDE CUTTING NIPPERS.

For many purposes this style of Nipper is exceedingly useful. It is used largely by model makers and jewelers, and is furnished in the same sizes and at the same prices as the No. 110 End Cutting nippers.



FIG. 234. RUSSIAN CUTTING NIPPERS.

This is a style of cutting nipper comparatively new to this market. The form of construction makes it exceedingly strong, and it will cut heavier wire with greater ease, than the ordinary style of End Cutting nippers.

Sizes, 4 in. 4½ in. 5 in. 6 in.
Prices, \$0.45 .50 .60 .75

We do not warrant Cutting Nippers, as our experience has proved that ninety per cent. of the breakage in Cutting Nippers is the result of careless handling. Oftentimes the operator uses the Nipper as if it were a Plier. For very hard stock, such as music wire, a Shear should be used, although the Button plier, Fig. 226, which cuts on the shear principle, will be found well adapted.



FIG. 235. BELLHANGERS'.

Bell Hangers' pliers, Fig. 235, are used very largely by electricians. We sell quantities of the best German quality "All Steel."

A good many of our customers like them full as well as the P. S. Stubs' make, but there are a great many who will have nothing but the Stubs'.

Size,	4 in.	4½ in.	5 in.	5½ in.
Price, German,	\$0.70	.70	.70	.75
" Stubs',	.85	.85	.85	.85

Size,	6 in.	7 in.	8 in.
Price, German,	\$0.85	1.30	1.50
" Stubs',	.95	1.50	2.00

NICKEL PLATED PLIERS.

We sell a great many of the Bell Hangers' style of Pliers, handsomely finished and nickel plated, and can furnish any of the lines of Pliers shown here at an additional expense of 30 cents each for all sizes up to and including 5 inch; 40 cents each for 6 and 7 in., and 50 cents for 8 in.



FIG. 236. BURNER PLIERS.

These Pliers are C. S. Osborne's make, and are of superior quality. Are handsomely finished and nickel plated.

Size,	5 in.	6 in.	7 in.
Price,	\$0.60	.65	.70

GAS PLIERS.

These are similar in style to the Burner Pliers, but very much heavier and stronger.

Size,	8 in.	10 in.	12 in.	14 in.
Price,	\$0.75	.95	1.15	1.35



FIG. 237. PEASE COMBINATION PLIERS.

The Pease Combination Pliers are drop-forged from best tool steel, and finished first-class in every respect. A convenient and useful tool for Steam and Gas fitters, Machinists, Tool-makers, etc., and is also

a very handy tool for house-work. Turning the handle and sliding from one hole to the other, changes capacity in the 6 inch from $\frac{1}{4}$ to 1 inch; and in the 10 inch from $\frac{1}{4}$ to $1\frac{1}{2}$ inch.

It is a combination Gas Plier, Wire Cutter, Wrench and Screw Driver.

6 in.,	Black,	\$1.00;	Nickel Plated,	\$1.15.
10 "	" "	1.35;	" "	1.60.

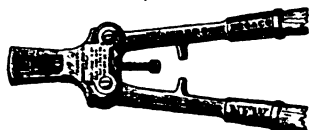


FIG. 238. CHAMBERS' BOLT CLIPPERS.

There are a great number of different kinds of Bolt and Rivet Clippers, or Cutters. We have sold the "Easy," "Eagle," "Lindsay," "Lightning," "Dayton," "Star," "Levalley," and others, and have gone back to our "Old Love," the Chambers', as the majority of our customers prefer these to any other.

The No. 1 is about the size of a pair of blacksmiths' tongs, and is especially useful for cutting off the ends of bolts and rivets on carriages, wagons, harness, etc. It will cut off all the bolts on a carriage in less than one-tenth of the time it can be done in the old way. The Cutters can be taken out and ground.

No. 1, \$6.00, for $\frac{1}{2}$ bolts or less.

" 2, 7.20, " $\frac{1}{2}$ " " used by Wheel-wrights, Machinists, Founders, etc.

No. 3, \$9.60, for $\frac{1}{2}$ bolts or less.

" 4, 12.00, " $\frac{1}{2}$ " "

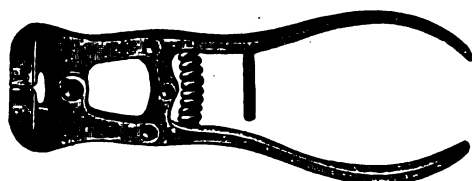
All of the above sizes are made to cut flush with the work.

No. 4, "Special," \$12.00, to cut $\frac{1}{2}$ inch bolts and all smaller sizes.

The No. 4 "Special" is extra strong and designed more particularly for the use of manufacturers of Portable Engines, Agricultural Implements, Boiler-makers, Car Builders, etc. It cuts a $\frac{1}{2}$ inch bolt or stay-rod, $\frac{1}{4}$ of an inch above the surface of the work through which it projects, thus always leaving $\frac{1}{4}$ of an inch for riveting.

When No. 4 is wanted, please specify whether "Regular" or "Special."

We usually carry on hand extra cutters for this make of Bolt Clipper, and can furnish to order any of the other extra parts if desired.



5 in.,	\$0.90	cuts wire to	3/4
7 "	1.45	" "	" "
Extra jaws for 5 in. \$0.40 each.			
" handles	5 "	25	"
" Springs	5 "	10	"
" jaws	7 "	60	"
" handles	7 "	30	"
" Springs	7 "	10	"

FIG. 239. LINDSAY'S GIANT CUTTING NIPPERS.

The Lindsay's Giant Cutting Nippers, Fig. 239, are the best of their class on the market; they are constructed upon mechanical principles, have more power, fewer parts, and are less liable to get out

of order than any other make of this class. We recommend and guarantee these to cut all kinds of wire, excepting tempered steel and music wire. All parts are interchangeable.



Size.	Price.	Extra Jaws per pair.
6 in.	\$1.60	\$0.55
8 "	1.80.	60
10 "	2.00	65
12 "	2.35	70
14 "	2.70	75

FIG. 240. CAREW'S PATENT WIRE CUTTERS.

The Carew Patent Wire Cutter is more generally used in wire-working factories, than any other wire cutter. The adjustable jaws are its main feature. Whenever they become dulled by use, they can easily be removed by driving from the

end showing prick mark, ground, and as easily replaced. This may be repeated as often as expedient, or they can be replaced by duplicate jaws, thus obviating the necessity of purchasing new cutters.

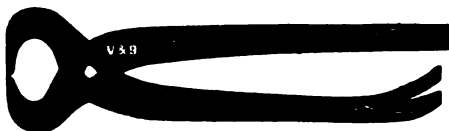


Size.	Price.
8 inches,	\$0.90
9 "	1.25
10 "	1.35
11 "	1.80
12 "	2.00

FIG. 241. PECK, STOW & WILCOX CUTTING NIPPER.

This make and style of cutting Nippers has been used largely by tinsmiths and metal workers, for upwards of forty years, and there are many who will use no other. Each nipper is tested before

leaving the factory, by cutting steel wire. Long handles give a great leverage, and they will cut good sized stock with comparative ease.



Size,	6 in.	7 in.
Price,	\$0.25	.30
Size,	8 in.	10 in.
Price,	\$0.35	.50

FIG. 242. CARPENTERS' PINCERS.

This tool is not used to any extent for cutting, but is useful for drawing out brads, and "skinnin" catfish. The 6 inch

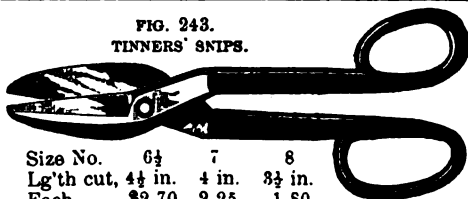
is made with straight handles, other sizes have the screw driver and claw, as shown in Fig. 242.

SHEARS AND SNIPS.

The line of Tinnerns' Shears and Snips shown here, are made by the Peck, Stow & Wilcox Co. Many of the regular Shear makers also make Tinnerns' Shears, but none of them seem to have the "knack."

The P. S. & W. Snips, although a trifle higher in price are well worth the difference.

The No. 11 is a new size, and is very handy for light work.

FIG. 243.
TINNERS' SNIPS.

Size No.	6½	7	8	
Lg'th cut,	4½ in.	4 in.	3½ in.	
Each,	\$2.70	2.25	1.80	
Size No.	9	10	11	
Length Cut,	3 in.	2½ in.	2 in.	
Each,	\$1.35	1.25	1.15.	

FIG. 244.
EACH, \$0.85.

The Dental Snips, Fig. 244, have blades with one and one-half inch cut; this is a most useful tool for cutting light sheet metal. Made in one size only.

FIG. 245.



The Ajax Shears or Snips, Fig. 245, are made of refined cast iron, they are in appearance similar to those shown in Fig. 243. We sell a great many to those who use a tool of this kind but little, as they serve very well for occasional use, and are extremely low priced.

Length of cut,	2 in.	2½ in.	3 in.
Each,	\$0.50	.65	.75



FIG. 246. PRICE, \$2.25.

Double Cutting Shears, Figs. 246 and 247, are designed especially for cutting any kind of metal cylinders.

The method of cutting avoids waste, and leaves the edges and corners smooth. The blade is pointed and can be readily inserted in the metal at the point desired to begin the cutting. They are equally well adapted to cutting flat, square or irregular work.

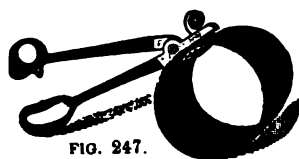
FIG. 247.
PRICE, \$3.00.

FIG. 248.

Straight Handle Trimmers.	Bent Handle Trimmers
\$0.60	7 in.
.65	8 "
.70	8½ "
.80	9 "
1.05	10 "
1.25	11 "
1.40	12 "
1.60	13 "
Extra heavy 14 in 2.50	

Left Hand.	Left Hand
\$0.90	8½ in.
1.50	11 "
	12 "
	1.75

To those who desire a better quality of Shear than is usually obtainable, we recommend the Heinisch make, believing them to be the best goods made.

We can furnish any of the above sizes full nickel-plated, at an advance of 20 per cent on the above prices. The lengths given above, are over all.

Fig. 248, represents the Straight Handle Trimmer.

The Bent Handle Trimmers (not illustrated) are a trifle heavier than the Straight, and are more generally used in the larger sizes, from 9 inches upwards.

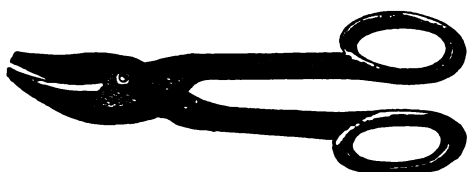


FIG. 249. CIRCULAR HAND SHEARS OR SNIPS.

No.	7	8	9	10
Price,	\$3.15	2.70	2.25	2.00



FIG. 250. JEWELERS' OR PLATERS' SNIPS.

No.	1	2	4	5
Cut,	3½ in.	3 in.	2 in.	1½ in.
Price,	\$2.25	2.00	1.50	1.25

We can also furnish the No. 2 and 4 Jewelers' Snips with circular blades.

Price, \$2.75 and \$2.25 respectively.



FIG. 251. BENCH SHEARS.

No.	00	0	1	3	4	5	6
Cut,	12 in.	10½ in.	9 in.	8½ in.	8 in.	7 in.	6 in.
Price	\$13.50	12.00	8 00	6.00	5.00	4.00	3.50



FIG. 252. STOW'S IMPROVED SQUARING SHEARS.

The tools shown on this page are all of the Peck, Stow & Wilcox make, and for quality cannot be excelled.

Circular Hand Shears Fig. 249, correspond in size with the same numbers as the Tinners' Snips on opposite page.

Stow's improved Squaring Shears, Fig. 252, shows the latest form of squaring shear for general work, side springs being substituted for pedal springs, which adds to their durability, and increases the power.

No. 120 \$34.20 cuts, 20 inches.

" 125 43.20 " 25 "

" 130 48.60 " 30 "

The No. 120 and 125 are used principally for tin and thin sheet brass. The No. 130 for sheet iron, as well as for thinner metals.

Every Squaring Shear is fully tested before leaving factory; will cut wet tissue paper the whole length of the blade, and is fully warranted.

The machine we show here is the one most generally used in tin shops and manufacturing establishments.

The Peck, Stow & Wilcox Co. make some forty odd styles of Squaring Shears, both foot and power, cutting up to ¼ thick and 72 inches in length. Also a very large variety of Rotary, Curve, Beveling, and special Shearing Machines of all kinds. They are the most extensive manufacturers of tools for tinners and sheet metal workers in the world.

We will gladly furnish any information regarding this class of tools, and in this connection we beg to state that we will be pleased at any time to receive and answer all correspondence relating to machinery and tools of any kind. Our great experience, both in using and selling machinery and tools, is at the service of our customers.

FILES.

We have handled the Nicholson make of Files for nearly twenty years, and have in the meantime bought and sold (in greater or less quantities) files made by six or eight other leading manufacturers. Some of our customers don't like them—wouldn't have them—but there is no tool made about which ideas and opinions vary so greatly, as a file; there isn't a file-

maker on earth whose product suits every one, but we think the Nicholson files satisfy a larger portion of consumers than any other file made in this country.

They are, in point of uniformity, finish and all qualities that go to make up a good file, a superior article. Although higher in price, there are more Nicholson Files sold than of any other make. This fact speaks for itself.

FIG. 253.

MILL AND ROUND.						HAND, WARDING AND PILLAR.									
BASTARD.			2ND CUT.			We keep Dead Smooth files in Flat, Hand, and Half Round. Prices are double the price of Bastard.	BASTARD.			2ND CUT.		SMOOTH.			
Inch.	Each.	Dozen.	Each.	Dozen.	Each.		Dozen.	Each.	Dozen.	Each.	Dozen.	Each.	Dozen.		
3	}	\$0.08	.81	.10	.98	3	}	\$0.10	\$1.02	\$0.13	1.22	\$0.14	\$1.35		
3½															
4															
5															
6		.09	.90	.11	1.08	5		.12	1.13	.14	1.35	.15	1.49		
8		.10	1.02	.12	1.20	6		.13	1.26	.15	1.49	.17	1.65		
10		.13	1.31	.16	1.53	8		.17	1.67	.20	1.97	.22	2.15		
12		.17	1.71	.20	1.98	10		.24	2.34	.27	2.70	.30	2.96		
14		.25	2.43	.28	2.79	12		.34	3.38	.39	3.87	.42	4.23		
16		.35	3.51	.40	4.00	14		.47	4.73	.54	5.40	.59	5.85		
18		.50	4.95	.57	5.63	16		.65	6.44	.73	7.29	.79	7.88		
		.68	6.80			18		.87	8.64	.97	9.68	1.04	10.35		
FLAT AND SQUARE.						HALF-ROUND.									
BASTARD.			2ND CUT.			SMOOTH.	BASTARD.			2ND CUT.		SMOOTH.			
Inch.	Each.	Dozen.	Each.	Dozen.	Each.		Dozen.	Each.	Dozen.	Each.	Dozen.	Each.	Dozen.		
3	}	\$0.09	\$0.90	\$0.11	\$1.08	\$0.12	\$1.20	3	}	\$0.12	\$1.13	\$0.14	\$1.35	\$0.15	\$1.49
3½															
4															
5															
6		.10	.99	.12	1.17	.13	1.30	5		.13	1.26	.15	1.51	.17	1.67
8		.12	1.13	.14	1.33	.15	1.47	6		.15	1.44	.17	1.71	.19	1.88
10		.16	1.53	.18	1.80	.20	1.96	8		.20	1.94	.23	2.25	.25	2.48
12		.21	2.12	.25	2.46	.27	2.66	10		.26	2.61	.31	3.04	.33	3.29
14		.30	3.02	.35	3.47	.38	3.78	12		.35	3.51	.41	4.05	.44	4.40
16		.43	4.28	.49	4.90	.53	5.31	14		.48	4.77	.55	5.45	.59	5.90
18		.59	5.90	.67	6.69			16		.65	6.53	.75	7.43	.80	7.97
		.80	7.95	.89	8.90			18		.88	8.82	.99	9.90	1.06	10.58
SLIM PITSAW						KNIFE.									
TAPER.			TAPER.			BLUNT.	BASTARD.			HEAVY		LIGHT			
Inch.	Each.	Dozen.	Each.	Dozen.	Each.		Dozen.	Each.	Dozen.	Each.	Dozen.	Each.	Dozen.		
3	}	\$0.05	\$0.50	\$0.05	\$0.54	\$0.11	\$1.04	3	}	\$0.12	\$1.13	\$0.10	\$0.95		
3½															
4															
4½															
5		.06	.54	.06	.59	.12	1.13	4½		.13	1.26	.11	1.08		
6		.07	.63	.07	.66	.15	1.44	5		.13	1.26	.11	1.08		
8		.08	.77	.08	.77	.20	1.94	6		.15	1.44	.15	1.47		
10		.11	1.08	.10	.95	.26	2.61	8		.20	1.94	.23	2.24		
12		.17	1.71	.14	1.35			10		.26	2.57	.21	2.03		
14		.26	2.57	.21	2.03			12							
16								14							
18								16							
20								18							

WOOD RASPS AND FILES.

Wood Rasps, Fig. 255, we sell in half round shape, they are quite coarsely cut.

Length, 6 in.	8 in.	10 in.	12 in.	14 in.
Each, \$0.17	.25	.35	.50	.70
Doz., 1.70	2.40	3.50	4.90	6.75

Cabinet Rasps are half oval, and cut considerably finer than the Wood Rasps.

Length, 6 in.	8 in.	10 in.	12 in.	14 in.
Each, \$0.25	.35	.45	.60	.80
Doz., 2.40	3.30	4.50	6.00	7.85

Cabinet Files are of the same shape as Cabinet Rasps, the cut is perhaps a little coarser than a Bastard File of the same length, they take the same prices as Wood Rasps in opposite column.

Horse Rasps, Fig. 256, we sell only in the Heller Bro.'s Brand, this firm make a specialty of Horse Shoer's tools, and seem to have the "knack" of making them just right.

Length 12 in.	13 in.	14 in.	15 in.	16 in.
Each, \$0.50	.55	.65	.75	.90
Doz. 4.50	5.35	6.35	7.50	8.80

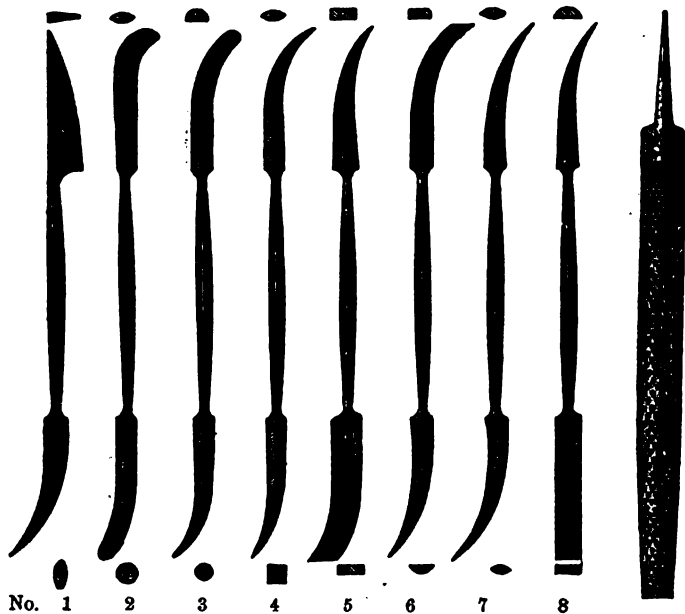


FIG. 254. RIFFLER FILES AND RASPS.

Wood Files are the same shape and price as Wood Rasps.



FIG. 256. HORSE RASP.

The Riffer Files and Rasps, Fig. 254, are used by carvers, pattern makers, stone cutters, etc. We keep them in two lengths, 6 and 8 inches.

6 inch, per set of six, \$2.50; each, 50 cts.
8 " " " " 3.00; " 60 "

SPECIAL FILES.

We can furnish a great variety of files that are not shown or priced here, such as Silver Riffers, Float, Cant, Slotting, Feather Edge, Gulleting, Ginsaw, High-Back, Hook Tooth, Checquering, etc., etc.

F. L. GROBET FILES.

These files, as well as the Stubs' are used largely by Machinists, Tool-makers, and Jewelers, and are preferred by many for general bench work.

Until a comparatively recent time, all files of this class were imported.

There are now three or four American manufacturers, who make very complete lines.

We have handled the best known brands, American and Imported, and are convinced that the imported are superior: and of those we have used and sold, we give preference to the F. L. Grobet brand,

more especially as regards temper; our judgment being based upon their use in our shops, and reports of our customers who have used large quantities, and who have used a number of different brands, both American and imported.

The Grobet files are somewhat higher in price than any other make, but we believe they are well worth the difference.

(The above remarks do not refer in any way to P. S. Stubs' files, which are commercially considered as belonging in another class, and of course, stand on the highest plane of excellence).

- | | |
|----------------|------------------------|
| No. | No. |
| 1. Round. | 7. Barrette three cut. |
| 2. Square. | 8. Three-Square. |
| 3. Crossing. | 9. Round Edge Joint. |
| 4. Half-Round. | 10. Knife. |
| 5. Barrette. | 11. Equalling. |
| 6. Taper Flat. | 12. Narrow Pillar. |

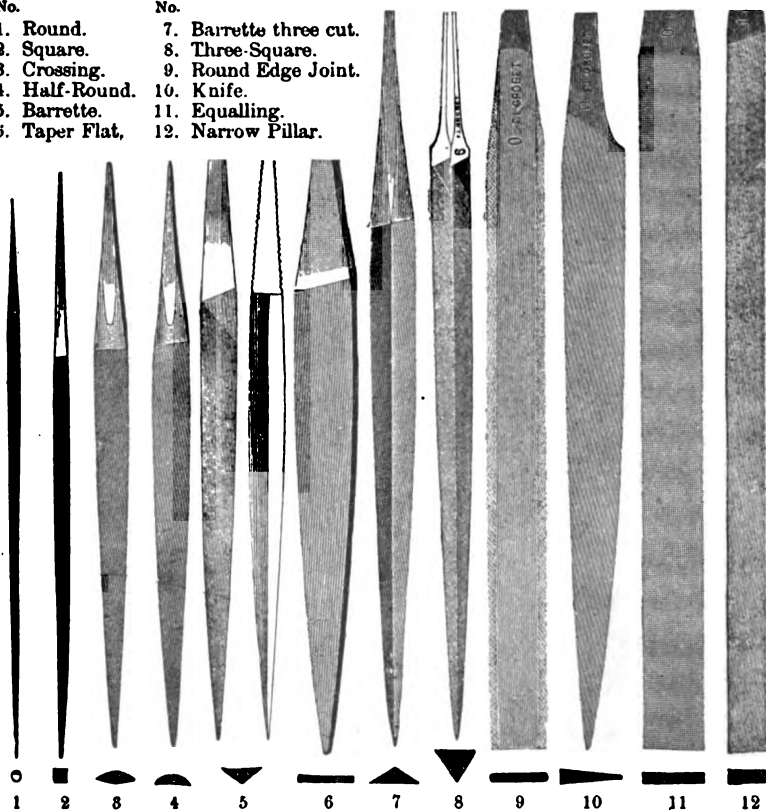


FIG. 257.

PRICE LIST GROBET FILES.

		Length, 3 in.	3½ in.	4 in.	4½ in.	5 in.	6 in.	8 in.
HAND FILES Have one Safe Edge.	Cut No. 0.	Each, \$0.16	\$0.17	\$0.25	\$0.27	\$0.28	\$0.33	\$0.45
		Dozen, 1.58	1.67	2.48	2.66	2.84	3.24	4.46
	Cut No. 2.	Each, \$0.18	\$0.21	\$0.29	\$0.30	\$0.31	\$0.37	\$0.50
		Dozen, 1.81	2.07	2.84	3.02	3.24	3.65	5.04
	Cut No. 4.	Each, \$0.21	\$0.23	\$0.30	\$0.32	\$0.35	\$0.39	\$0.56
		Dozen, 2.07	2.25	3.02	3.24	3.47	3.87	5.63
	Cut No. 6.	Each, \$0.24	\$0.27	\$0.35	\$0.37	\$0.39	\$0.43	\$0.63
		Dozen, 2.43	2.66	3.47	3.65	3.87	4.32	6.26
HALF-ROUND,	All Num- bers,	Each, \$0.16	\$0.17	\$0.25	\$0.27	\$0.30	\$0.36	\$0.48
		Dozen, 1.62	1.67	2.48	2.70	2.97	3.56	4.89
ROUND,	All Num- bers,	Each, \$0.10	\$0.11	\$0.20	\$0.21	\$0.23	\$0.26	\$0.41
		Dozen, .99	1.08	1.98	2.07	2.25	2.61	4.10
PILLAR, " NARROW, " EXT. "	Cut No. 0.	Each, \$0.15	\$0.16	\$0.24	\$0.25	\$0.27	\$0.30	
		Dozen, 1.44	1.53	2.34	2.48	2.66	3.02	
	Cut No. 2.	Each, \$0.15	\$0.16	\$0.24	\$0.28	\$0.30	\$0.35	
		Dozen, 1.44	1.53	2.34	2.84	3.02	3.47	
	Cut No. 4.	Each, \$0.15	\$0.16	\$0.25	\$0.20	\$0.33	\$0.37	
		Dozen, 1.44	1.58	2.48	3.02	3.24	3.65	
All these have two Safe Edges.	Cut No. 6.	Each, \$0.15	\$0.18	\$0.26	\$0.34	\$0.37	\$0.41	
		Dozen, 1.44	1.76	2.61	3.42	3.65	4.10	
	Cuts Nos. 0 and 2,	Each, \$0.20	\$0.20	\$0.28	\$0.29	\$0.30	\$0.32	
		Dozen, 1.94	2.03	2.75	2.88	2.97	3.20	
	Cuts Nos. 4 and 6,	Each, \$0.22	\$0.23	\$0.30	\$0.32	\$0.33	\$0.35	
		Dozen, 2.14	2.23	3.03	3.17	3.27	3.52	
TRIANGULAR OR THREE SQUARE,	All Num- bers,	Each, \$0.12	\$0.12	\$0.20	\$0.22	\$0.24	\$0.28	
		Dozen, 1.13	1.22	2.03	2.16	2.34	2.79	
SQUARE, . . .	All Num- bers,	Each, \$0.15	\$0.16	\$0.25	\$0.27	\$0.30	\$0.36	
		Dozen, 1.44	1.53	2.48	2.70	2.97	3.66	
CROSSING AND BARRETTE,	All Num- bers,	Each, \$0.15	\$0.16	\$0.25	\$0.27	\$0.30	\$0.36	
		Dozen, 1.44	1.53	2.48	2.70	2.97	3.66	

FIG. 257a. NEEDLE FILES.

4½ inch, { Each, \$0.10 } These are put up in dozens, either assorted (one of each
 { Dozen, .90 } kind) or in kinds, of the following shapes, viz: Round,
 6½ inch, { Each, \$0.13 } Half-round, Flat, Oval, Knife, Square, Three-square, Equal-
 { Dozen, 1.20 } ing, Slitting, Joint, Barrette and Half-round Blunt. As-
 sorted dozen sent, unless otherwise ordered.

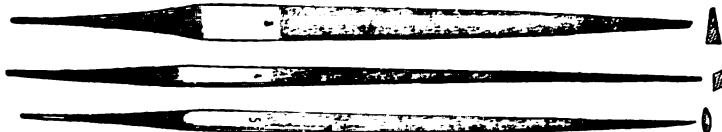


FIG. 257b. DIE SINKERS FILES. \$1.35 per set. Postage, 5 cts.

These Files are furnished in sets of one dozen assorted shapes, similar to those described as Needle Files, but are much heavier. Every Tool maker should have a set of these files.

F. L. GROBET FILES.

These files, as well as the Stubs' are used largely by Machinists, Tool-makers, and Jewelers, and are preferred by many for general bench work.

Until a comparatively recent time, all files of this class were imported.

There are now three or four American manufacturers, who make very complete lines.

We have handled the best known brands, American and Imported, and are convinced that the imported are superior: and of those we have used and sold, we give preference to the F. L. Grobet brand,

more especially as regards temper; our judgment being based upon their use in our shops, and reports of our customers who have used large quantities, and who have used a number of different brands, both American and imported.

The Grobet files are somewhat higher in price than any other make, but we believe they are well worth the difference.

(The above remarks do not refer in any way to P. S. Stubs' files, which are commercially considered as belonging in another class, and of course, stand on the highest plane of excellence).

- | | |
|----------------|------------------------|
| No. | No. |
| 1. Round. | 7. Barrette three cut. |
| 2. Square. | 8. Three-Square. |
| 3. Crossing. | 9. Round Edge Joint. |
| 4. Half-Round. | 10. Knife. |
| 5. Barrette. | 11. Equalling. |
| 6. Taper Flat. | 12. Narrow Pillar. |

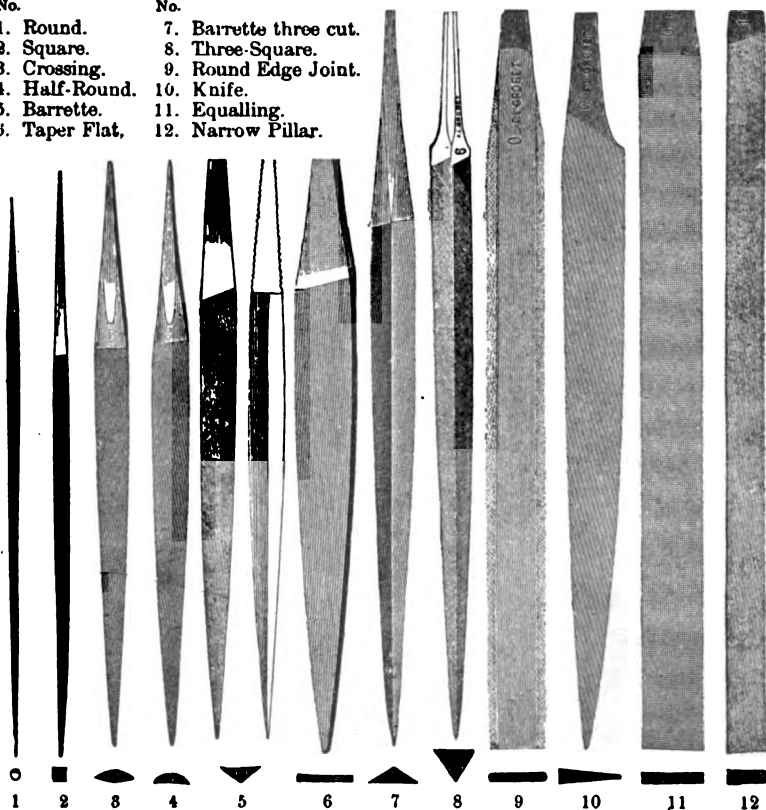


FIG. 257.

PRICE LIST GROBET FILES.

		Length, 3 in.	3½ in.	4 in.	4½ in.	5 in.	6 in.	8 in.
HAND FILES Have one Safe Edge.	Cut No. 0.	Each, \$0.16	\$0.17	\$0.25	\$0.27	\$0.28	\$0.33	\$0.45
		Dozen, 1.58	1.67	2.48	2.66	2.84	3.24	4.46
	Cut No. 2.	Each, \$0.18	\$0.21	\$0.29	\$0.30	\$0.31	\$0.37	\$0.50
		Dozen, 1.81	2.07	2.84	3.02	3.24	3.65	5.04
	Cut No. 4.	Each, \$0.21	\$0.23	\$0.30	\$0.32	\$0.35	\$0.39	\$0.56
		Dozen, 2.07	2.25	3.02	3.24	3.47	3.87	5.63
	Cut No. 6.	Each, \$0.24	\$0.27	\$0.35	\$0.37	\$0.39	\$0.43	\$0.63
		Dozen, 2.43	2.66	3.47	3.65	3.87	4.32	6.26
HALF-ROUND,	All Num- bers,	Each, \$0.16	\$0.17	\$0.25	\$0.27	\$0.30	\$0.36	\$0.48
		Dozen, 1.62	1.67	2.48	2.70	2.97	3.56	4.82
ROUND,	All Num- bers,	Each, \$0.10	\$0.11	\$0.20	\$0.21	\$0.23	\$0.26	\$0.41
		Dozen, .99	1.08	1.98	2.07	2.25	2.61	4.10
PILLAR, " NARROW, " EXT. "	Cut No. 0.	Each, \$0.15	\$0.16	\$0.24	\$0.25	\$0.27	\$0.30	
		Dozen, 1.44	1.53	2.34	2.48	2.66	3.02	
	Cut No. 2.	Each, \$0.15	\$0.16	\$0.24	\$0.28	\$0.30	\$0.35	
		Dozen, 1.44	1.53	2.34	2.84	3.02	3.47	
	Cut No. 4.	Each, \$0.15	\$0.16	\$0.25	\$0.30	\$0.33	\$0.37	
		Dozen, 1.44	1.58	2.48	3.02	3.24	3.65	
	Cut No. 6.	Each, \$0.15	\$0.18	\$0.26	\$0.34	\$0.37	\$0.41	
		Dozen, 1.44	1.76	2.61	3.42	3.65	4.10	
TRIANGULAR OR THREE SQUARE,	Cuts Nos. 0 and 2,	Each, \$0.20	\$0.20	\$0.28	\$0.29	\$0.30	\$0.32	
		Dozen, 1.94	2.03	2.75	2.88	2.97	3.20	
	Cuts Nos. 4 and 6,	Each, \$0.22	\$0.23	\$0.30	\$0.32	\$0.33	\$0.35	
		Dozen, 2.14	2.23	3.03	3.17	3.27	3.52	
SQUARE, . . .	All Num- bers,	Each, \$0.12	\$0.12	\$0.20	\$0.22	\$0.24	\$0.28	
		Dozen, 1.13	1.22	2.03	2.16	2.34	2.79	
CROSSING AND BARRETTE,	All Num- bers,	Each, \$0.15	\$0.16	\$0.25	\$0.27	\$0.30	\$0.36	
		Dozen, 1.44	1.53	2.48	2.70	2.97	3.56	

FIG. 257a. NEEDLE FILES.

4½ inch, { Each, \$0.10 } These are put up in dozens, either assorted (one of each
 { Dozen, .90 } kind) or in kinds, of the following shapes, viz: Round,
 6½ inch, { Each, \$0.13 } Half-round, Flat, Oval, Knife, Square, Three-square, Equal-
 { Dozen, 1.20 } ing, Slitting, Joint, Barrette and Half-round Blunt. As-
 sorted dozen sent, unless otherwise ordered.

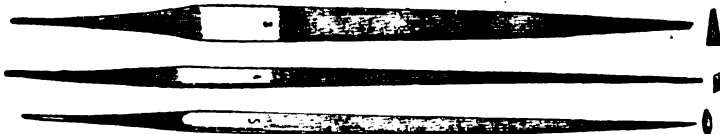


FIG. 257b. DIE SINKERS FILES. \$1.35 per set. Postage, 5 cts.

These Files are furnished in sets of one dozen assorted shapes, similar to those described as Needle Files, but are much heavier. Every Tool maker should have a set of these files.

P. S. STUBS' FILES.

We describe the shapes of some of the Stubs' files.

Saw files are about same shape and size as American Saw Files.

Warding, same shape as No. 6, page 66, but very thin.

Equaling, shape of No. 11, page 66, are quite thin.

Slim Taper, much lighter than the American Slim Taper, and is useful for filing Auger Bits and small knives.

Knife, same shape as No. 10, page 66.

Slitting, about this shape.

Round Edge Joint, same shape as No. 9, page 66. Cut on edge only, and furnished in different thicknesses.

SAW FILES.			WARDING AND EQUALING.			SLIM TAPER.		
Inch.	Double Cut.		Inch.	Bastard.	Smooth.	Inch.	Bastard.	Smooth.
3	{ Each, \$0.14 Dozen, 1.36		3	{ Each, \$0.16 Dozen, 1.58	\$0.18 1.76	3	{ Each, \$0.16 Dozen, 1.58	\$0.18 1.76
3½	{ Each, \$0.15 Dozen, 1.44		3½	{ Each, \$0.18 Dozen, 1.76	\$0.19 1.94	3½	{ Each, \$0.17 Dozen, 1.67	\$0.19 1.94
4	{ Each, \$0.16 Dozen, 1.60		4	{ Each, \$0.19 Dozen, 1.94	\$0.21 2.07	4	{ Each, \$0.18 Dozen, 1.76	\$0.21 2.07
4½	{ Each, \$0.23 Dozen, 2.24		4½	{ Each, \$0.27 Dozen, 2.66	\$0.30 3.02	4½	{ Each, \$0.26 Dozen, 2.61	\$0.30 3.02
5	{ Each, \$0.25 Dozen, 2.48		5	{ Each, \$0.28 Dozen, 2.84	\$0.32 3.90	5	{ Each, \$0.27 Dozen, 2.66	\$0.32 3.90
6	{ Each, \$0.28 Dozen, 2.80		6	{ Each, \$0.32 Dozen, 3.20	\$0.39 3.87	6	{ Each, \$0.34 Dozen, 3.38	\$0.39 3.87

SLITTING.			ROUND.			ROUND EDGE JOINT OR DRILL.		
Inch.	Bastard Cut.		Inch.	Bastard.	Smooth.	Inch.	Bastard.	Smooth.
3	{ Each, \$0.23 Dozen, 2.25		3	{ Each, \$0.16 Dozen, 1.58	\$0.19 1.94	3	{ Each, \$0.18 Dozen, 1.76	\$0.19 1.94
3½	{ Each, \$0.24 Dozen, 2.43		3½	{ Each, \$0.17 Dozen, 1.67	\$0.21 2.07	3½	{ Each, \$0.19 Dozen, 1.94	\$0.22 2.16
4	{ Each, \$0.27 Dozen, 2.61		4	{ Each, \$0.18 Dozen, 1.76	\$0.23 2.25	4	{ Each, \$0.23 Dozen, 2.25	\$0.24 2.43
4½	{ Each, \$0.34 Dozen, 3.38		4½	{ Each, \$0.25 Dozen, 2.52	\$0.30 3.02	4½	{ Each, \$0.30 Dozen, 3.02	\$0.33 3.29
5	{ Each, \$0.35 Dozen, 3.51		5	{ Each, \$0.27 Dozen, 2.66	\$0.32 3.20	5	{ Each, \$0.32 Dozen, 3.20	\$0.35 3.51
			6	{ Each, \$0.30 Dozen, 3.02	\$0.39 3.87	6	{ Each, \$0.39 Dozen, 3.87	\$0.42 4.23

NICHOLSON'S STUB FILES AND HOLDER.

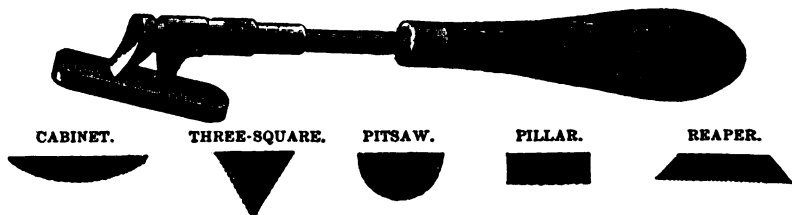
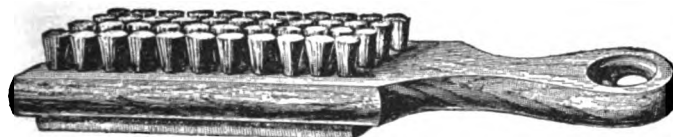


FIG. 258.

Price, \$5.00 per Set of 6 Stubs and Holder. Extra Files, 30 cents each.

FIG. 259.
FILE CARD.FIG. 260.
FILE CARD
AND
BRUSH.

The File Card, Fig. 259, also the File Card and Brush, Fig. 260, are provided with a Scorer. This is used to remove the "pins" which fill up and clog the teeth, causing scratches in the work if not removed. The Brush will be found a most efficient annex to the Card, especially upon finer files, removing the filings much more effectually than can be done by the Card alone.

File Cards, per doz., \$2 50; each, 25 cts. Postage, 5 cts.

File Cards and Brushes, per doz., \$4.40; each 40 cts. Postage, 7 cts.

We carry in stock the Card cloth similar to that used on these cards, 2 inches wide at 35 cts. per running foot; can also furnish Card cloth of any desired style, width or coarseness.

In Figs. 261 and 262, we show two styles of Files that, while comparatively

new, have met with a very large demand, as they seem to fill a want that has been hitherto unsupplied.

In order to introduce these Files to those who have never used them, we will send a sample file of either kind, by mail post-paid, upon receipt of the price. We do this, feeling assured that when once used, their value will be fully appreciated.

The Planer Knife File is cut alike on both sides, one end being a fine mill-cut, the other a fine double cut. This File is furnished in but one size, 10 inches long, $\frac{1}{2}$ inch wide, and about $\frac{1}{4}$ inch thick.

The Auger Bit File is a light File, about 7 inches long, one end being cut on the flat part, the other end on the edges. It is particularly useful for filing machine bits, and can also be used to advantage on all kinds of small moulding knives.



FIG. 261. AUGER BIT FILE. Each, 15 cts.; dozen, \$1.40.



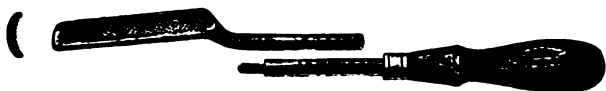
FIG. 262. PLANER KNIFE FILE. Each, 25 cts.; dozen, \$2.50.



FIG. 263. SURFACE FILE HOLDER. No. 4, \$1.00; No. 5, \$1.25 each.



FIG. 264 HORSE TOOTH RASP, PLAIN. \$1.25 each.



[5] FIG. 264a HORSE TOOTH RASP, JOINTED, NICKED. \$2.25 each.

HACK SAWS.

The trade in Hack Saws has been largely developed within a few years. Up to that time there was but a limited number of the Stubs' and German Frames and blades sold.

Their merits and utility seemed to be known and appreciated only by the German and English mechanics.

Our entire sales in a single year, would not exceed fifteen or twenty frames, and perhaps ten or twelve dozen blades, while now, our daily sales exceed this. The introduction of the hard blades, of the Star, Superior and Griffin type, has doubtless caused the increased demand.

The ten inch Stubs' frame and blade sold for three dollars. Now, a first-class frame, with a dozen blades, can be obtained for less than one-half of this price.

The imported frames, while perhaps a little stronger, are not nearly as convenient as the modern frame, which can be adjusted in length and faced in four directions. The cost of blades is less than the cost of time and files used, in sharpening the old style blades.

The "Superior" Hack Saw Frames, Fig. 265, are made of $\frac{7}{8}$ by $\frac{1}{2}$ inch steel; are nicely finished and nickel plated. This is a very substantial and serviceable frame; it is constructed so as to face the blades in four different directions, and will take any make of blades.

Frame for 8 in. 10 in. 12 in. blades.
Each, \$0.60 \$0.70 \$0.80

The No. 9 Hack Saw frame, Fig. 266, is an extension frame, made of forged steel and nickel plated, holding 8, 9, 10, 11 and 12 inch blades. The steel sheath makes the frame very stiff, yet light.

There is quite a variety of adjustable frames made, and we have selected this as being as good as any we know of. Price of frame only, \$0.90.

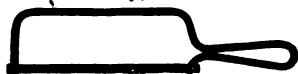


FIG. 267. YALE HACK SAW FRAME.

The above frame is made from round steel, nickel plated; the 8 inch size takes



FIG. 265. "SUPERIOR" HACK SAW FRAME.

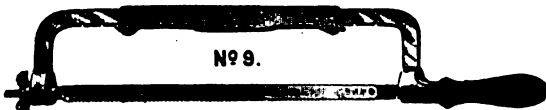


FIG. 266. ADJUSTABLE HACK SAW FRAME.

an ordinary 8 inch hack saw blade of any make, price with one blade, 40 cents; postage, 8 cents. The small size takes a 6 inch blade of any make, but is usually provided with a special style of blade $\frac{1}{2}$ inch wide, very thin and flexible, and with fine teeth. We sell large quantities of these blades for special work. Price of six inch frame and one blade, \$0.30; postage, 5 cents. Extra blades, \$0.75 per dozen; 8 cents each.

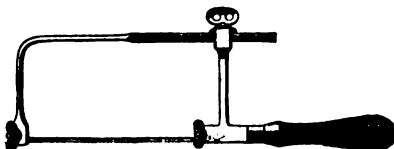


FIG. 268. JEWELERS' SAW FRAME.

The Jewelers' Saw Frame, Fig. 268, is made of forged steel, with rosewood handle. It is nickel plated, and will hold saw blades from 2 to 6 inches in length.

Price of frame only \$0.75.

Price of Jewelers' blades for same, 30c. per dozen.



FIG. 269. METAL MITRE SAW.

The above saw has a blade 8 inches long; is $1\frac{1}{2}$ inches wide under the back. It has 20 teeth to the inch, and is made of 25 English gauge sheet steel; has a strong Brass back and Ebony handle. Will be found especially desirable for cutting thin Metals and many other purposes.

Price each, \$1.00. Postage, 10 cts.

STAR HACK SAW BLADES.

The Star Brand of Hack Saw blades made by the Millers Falls Company, are the most popular and widely known saw blades on the market. They have 14 teeth to the inch.

Length, 6 in.	7 in.	8 in.	9 in.
Per doz., \$0.50	\$0.55	\$0.58	\$0.63
Each, .07	.07	.07	.08
Length, 10 in.	11 in.	12 in.	
Per doz., \$0.77	\$0.85	\$0.95	
Each, .09	.10	.12	

Postage on blades, per dozen, from 2 to 8 cents respectively.

FINE TOOTH BLADES.

We carry in stock 8, 9 and 10 inch blades, Star brand, with 95 teeth per inch, used especially for sawing Tubing, Sheet Metal, etc. Same price as regular blades.

If fine tooth blades are wanted, please specify when ordering.

"SUPERIOR" HACK SAW BLADES.

The "Superior" Hack Saw Blades have been on the market only about a year, and in this short time they have won considerable favor. They are first-class for all kinds of work, and for cutting Tubing and thin Metals, they excel by far, any blades we know of. The shape of tooth is quite different from any of the other styles. In working this, use a strong frame; the harder the blade is stretched the better it works. While working with them, bear on heavily, same as with a coarse file.

The 8 and 10 in. blades are $\frac{1}{2}$ inch wide; 12 inch blades are $\frac{3}{4}$ inch wide.

Size.	Per Doz.	Each.
8 in.	\$0.75	\$0.08
10 in.	.90	.10
12 in.	1.00	.12

POWER MACHINE.

The Power Hack Sawing Machine, Fig. 270, is one of the few Machines that, from personal experience, we can praise more highly than the makers do in their circulars

We have three of them in use, and their work has surprised us. We have cut off with one blade, thirty-one pieces of two and one-eighth inch round steel; have cut off in six hours, with one blade, eighty pieces of flat steel three-eighths by one and one-half inch, and this is a regular matter of daily work—not in any way a special test.

In nine shops out of ten, this tool will take the place of a cutting-off machine, costing ten times as much. The labor and expense of running it is practically nothing, as it can be attended to by one of the hands, without hindering his other work. It takes but an instant to clamp in the stock and start the Machine, after which it takes care of itself. Our superintendent tells us that the cost of oil used on a Cutting-off Machine, will pay for the blades used in this. Its cost, considering weight and capacity, is surprisingly low, and we have never failed in making a sale when the Machine was seen in operation. On account of evenness of pressure and stroke, hack saw blades will do at least



FIG. 270.

three times as much work when used in this Machine than when used by hand. The Saw Frame receives 12 inch blades.

Price of Machine, \$22.50. Price of Adjustable Rest, \$1.50 extra.

HAMMERS.*

In hammers we still retain the old line of David Maydole's make. We have sold these for nearly a quarter of a century, and for uniformity of excellence, they still hold their own.

In spite of the unconditional warranty under which we have sold these hammers, we have not had to replace an average of one hammer in five hundred.



FIG. 274. HAND.

No.		Weight.
61	\$1.00	3 lbs.
62	.95	2½ "
65	1.00	2½ "

{ Shoulder Pene.

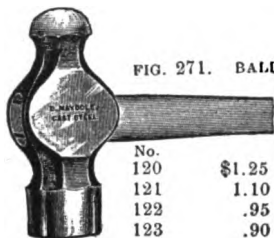


FIG. 271. BALL PENE.

No.		Weight.
120	\$1.25	3 lbs.
121	1.10	2½ "
122	.95	1½ "
123	.90	1½ "
124	.80	1½ "
125	.75	1 "
126	.70	12 oz.
127	.65	10 "
128	.60	7 "

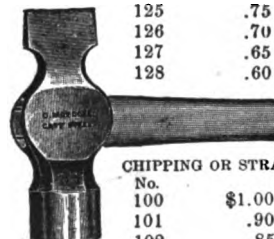


FIG. 272.

CHIPPING OR STRAIGHT PENE.

No.		Weight.
100	\$1.00	1½ lbs.
101	.90	1½ "
102	.85	1½ "
103	.80	12 oz.



FIG. 273.

RIVETING OR CROSS PENE.

No.		Weight.
40	\$0.55	1½ lbs.
41	.45	1½ "
42	.40	12 oz.
43	.35	7 "
44	.30	4½ "

The weights of all hammers as given here, are without handles.

*Blacksmiths' Hammers and tools, see pages 75 to 84 inclusive.



FIG. 275. NICKEL.

The "Mechanics' Pride" is similar in style to the Ball Pene (Fig. 271), very handsomely polished and furnished in an unusual variety of sizes.

No.		Weight.
3	\$0.80	3 oz.
4	.90	6 "
5	.95	8 "
6	1.00	12 "
7	1.10	1 lb.
8	1.20	1½ "
9	1.30	1½ "
10	1.50	2 "
11	1.75	2½ "
12	2.00	3½ "

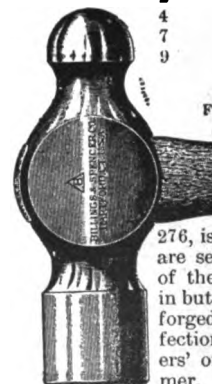
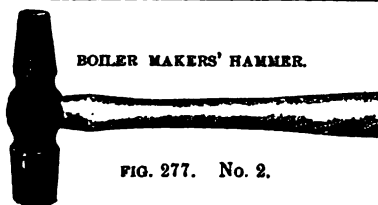


FIG. 276.

The Billings & Spencer Co's Machinists' Ball Pene Hammer, shown in Fig. 276, is a new tool, and we are selling a great many of them; they are made in but four sizes, are drop forged, and simply perfect as a fine tool makers' or machinists' hammer.

Every Hammer of this make is fully warranted, and we will replace any imperfect one that is purchased from us.

No.		Weight.
1	\$0.90	4 oz.
2	1.25	12 "
3	1.50	1½ lbs.
4	1.80	1½ "



BOILER MAKERS' HAMMER.

FIG. 277. No. 2.

Weight, about 3 lbs. \$1.50 each.

The Boiler Makers' Hammer shown, Fig. 277, is comparatively a new tool (of this class) on the market.

Shape, weight and hang of hammer are the essential features embodied in this tool. Every one fully warranted.



FIG. 278. No. 658.

PLANISHING HAMMER.

Weight, lbs.,	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Each,	\$0.75	.75	.75	1.00
Weight, lbs.,	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$
Each,	\$1.25	1.40	1.50	1.90

We can furnish a Planishing Hammer (No. 659) with one Square end, and its opposite end Round, at the same prices as above.



FIG. 279.

The Raw Hide Mallets, Fig. 279, are useful for a great variety of purposes. We sell a great many of them to Foundries for use in the core-room.

Nos.	Each.	Diam.	Length.	Weight.
0	\$0.25	1 in.	$2\frac{1}{2}$ in.	$1\frac{1}{2}$ oz.
1	.30	$1\frac{1}{2}$ "	$2\frac{3}{4}$ "	$3\frac{1}{2}$ "
2	.35	$1\frac{3}{4}$ "	3 "	6 "
3	.40	$1\frac{1}{2}$ "	$3\frac{1}{2}$ "	$7\frac{1}{2}$ "
4	.50	2 "	$3\frac{1}{2}$ "	10 "
5	1.10	$2\frac{1}{2}$ "	$4\frac{1}{2}$ "	21 "
6	1.40	$2\frac{1}{2}$ "	$4\frac{1}{2}$ "	23 "

Raw Hide Faced Hammers, Raw Hide Mallets and Mauls, Copper and Babbitt Metal Hammers are all useful for striking

a heavy blow without bruising the metal, marring or disfiguring finished surfaces.

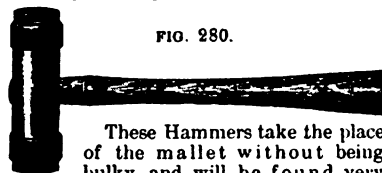


FIG. 280.

These Hammers take the place of the mallet without being bulky, and will be found very useful to any metal worker. The raw hide faces, held by the screw rings, can be quickly replaced, when worn by use.

Are made in two sizes: 5 oz., \$0.55; 10 oz., \$0.65. Can be sent by mail; postage, 6 and 12 cts. Extra faces 10 cts. per pair.

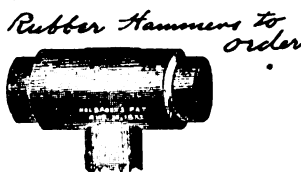


FIG. 281.

The Hide Faced Hammers, Fig. 281, are invaluable for Machinists, workers in Brass or Silver, Jewelry Manufacturers.

One pair of extra faces is furnished with each hammer, and when worn out they can be replaced at slight cost.

Nos.	Price, each.	Ext. Faces, per pair.	Wght., lbs.	Diam. of Face.
1	\$0.85	\$0.20	1	$1\frac{1}{2}$ in.
2	1.05	.25	$1\frac{1}{2}$	$1\frac{1}{2}$ "
3	1.25	.30	2	$1\frac{1}{2}$ "
4	1.85	.40	4	2 "
5	2.60	.55	$5\frac{1}{2}$	$2\frac{1}{2}$ "

RAW HIDE MAUL.

No.	Each,	Weight, 3 lbs.
1	\$1.60	
2	1.80	4 "
3	2.00	6 "
4	2.50	8 "
5	2.75	10 "

COPPER AND BABBITT METAL HAMMERS.

Weight, lbs.,	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Copper, each,	\$0.50	\$0.70	\$0.90	\$1.10
Babbitt, "	.30	.45	.60	.75
Weight, lbs.,	3	4	5	
Copper, each,	\$1.25	\$1.75	\$2.25	
Babbitt, "	.85	1.10	1.50	



FIG. 282.
HORSE SHOE MAGNET HAMMER.

This Hammer is especially adapted for Card Advertising Work. They are made of fine steel and are strong permanent magnets.

The commonly used size weighs 5 oz. Price, with short handle, \$1.50; with long handle (24 to 36 inches), \$2.00. Can furnish them with handles jointed, in

either two or three sections, at an additional expense of \$0.75 and \$1.25 each.

We carry in stock and can furnish a great variety of hammers different from those shown here, among them a very complete line, in small sizes of the different styles shown in Figs. 271, 272, & 273.—some of them as light as 1 oz.; also Upholsters', Tanners', Brick, Belgian Paving, Regular Paving, Coopers', Geologists', Magnetic, Jewelers', Chasing, Nail and Brad, Drilling, Macadamizing, Stone Cutters', etc., etc.

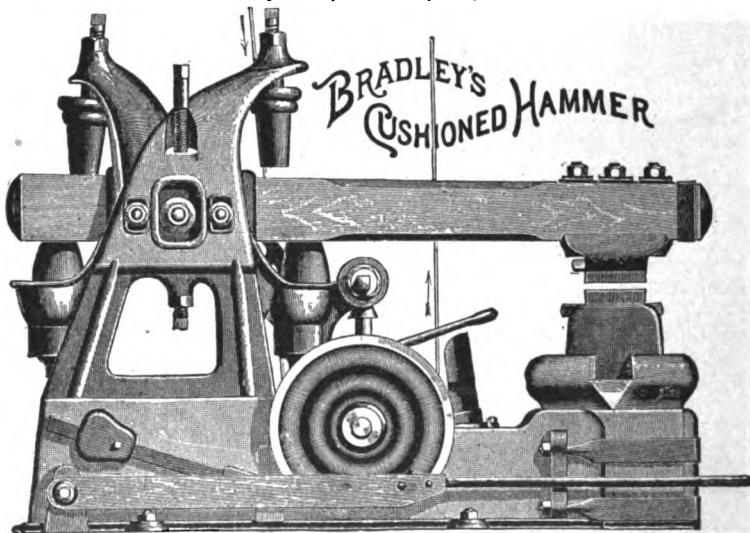


FIG. 283. THE BRADLEY CUSHIONED HELVE HAMMER.

Below we submit a table giving approximately the capacity of each size of Bradley's Rubber Cushioned Helve Hammers, together with an estimate of the power required:

1 Size of Hammer.	2 Diameter of Driving Pulley.	3 Width of Belt.	4 Estimated Horse Pow. Required.	5 Average No. of Blows per Minute.	6* Aver. Size of Iron for which suited.	7 Floor Space.
25 pounds	12 inches	3 inches	$\frac{1}{2}$ to 1	400	1 inch	68 in. x 29 in.
40 "	14 "	4 "	$1\frac{1}{2}$ to 2	300 to 315	$1\frac{1}{2}$ "	82 " x 34 "
60 "	18 "	6 "	2 to $2\frac{1}{2}$	290 to 300	$1\frac{3}{4}$ "	91 " x 43 "
80 "	18 "	6 "	$2\frac{1}{2}$ to 3	275	2 "	96 " x 48 "
100 "	18 "	6 "	$2\frac{3}{4}$ to 3	275	$2\frac{1}{2}$ "	96 " x 48 "
200 "	26 "	8 "	3 to $3\frac{1}{2}$	225 to 240	$3\frac{1}{2}$ to 4 in.	106 " x 54 "

We illustrate in this catalogue but one style of Power-Hammer, the Bradley Helve Hammer, for general shop purposes. We sell more of this type than any other. Will be pleased to give prices and information on this, or any other style.

*These estimates are for Iron. Reduce the size one-third for Steel.

ANVILS.



FIG. 284.

In wrought iron anvils, the Wright, Wilkinson and Armitage "Mousehole" are the best known; they are all English made. We believe there is but one American concern, and their output is small. Have been informed (by the house who sells them) that they are equal to the best English.

The price has been in the neighborhood of twelve cents per pound, varying from one-half to one cent more or less for a great many years.

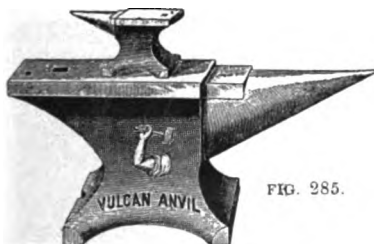


FIG. 285.

Cast iron anvils with tool steel face and horn, are coming into more general use; they are much less in price, and answer for two-thirds of the purposes for which anvils are used.

A point of advantage claimed by one maker of cast anvils is, that they are free from the noisy clang and ring of the wrought iron anvil, but your average blacksmith would not know how to do a job on an anvil that didn't ring—doubtless a question of habit and poetic sentiment.

No.	Each.	Wt.	No.	Each.	Wt.
0	\$2.30	10 lbs.	8	\$6.40	80 lbs.
2	3.30	20 "	9	7.20	90 "
4	4.20	40 "	10	8.00	100 "
5	4.80	50 "	12	9.68	120 "
6	5.20	60 "	14	11.20	140 "
7	5.80	70 "	15	12.00	150 "

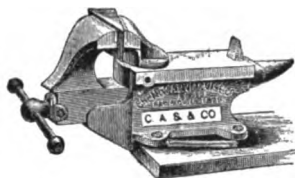


FIG. 286.

CHENEY'S COMBINED ANVIL AND VISE.

The Cheney Anvil and Vise is a convenient tool for general use, the jaws of Vise are steel faced, and the face of Anvil is chilled. It is by far the best combination Anvil and Vise we know of.

No.	Each.	Weight about	Face Anvil.	Width Jaws.	Jaws Open.
10	\$2.75	9 lbs.	2 x 4 1/2 in.	2 1/2 in.	3 in.
20	3.50	25 "	3 x 6 1/2 "	3 1/2 "	4 "
30	4.25	34 "	3 1/2 x 8 "	4 "	4 "
40	5.00	40 "	4 x 8 1/2 "	4 1/2 "	5 "

JEWELERS' ANVILS.

We carry in stock a line of imported Jewelers' Anvils, similar in shape to those in preceding column, ranging in weight from 1 to 3 pounds, made of solid cast steel and Mirror Polished.

Weight, lbs.,	1	1 1/2	2	2 1/2	3
Each,	\$1.00	1.50	2.00	2.25	2.75

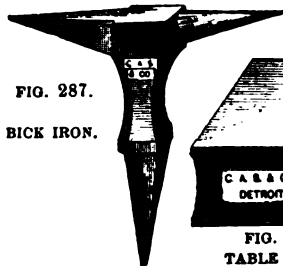


FIG. 287.

BICK IRON.

FIG. 288.
TABLE BLOCK.

The Bick Iron is a small anvil for light bench work.

Length face,	3 in.	4 1/2 in.	5 in.	7 in.	9 in.
Price each,	\$0.75	.90	1.00	1.50	3.75

Fig. 288, is a Square Anvil made of cast steel, mirror polished, and about one inch thick.

Size, inches,	2x2	3x3	4x4	5x5	6x6
Price each,	\$1.50	2.25	3.00	3.75	4.50

BLACKSMITHS' TOOLS.

All of our Blacksmiths' tools are made of excellent quality crucible steel, and are, we believe, as good as can be found

in the market. We carry in stock a large proportion of the sizes and kinds illustrated and priced here.



FIG. 289.
TOP SWAGE.

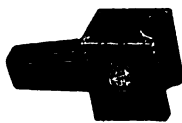


FIG. 291.
BOTTOM SWAGE.



FIG. 292. ROUND PUNCH.



FIG. 294. SQUARE PUNCH.



FIG. 290.
TOP FULLER.



FIG. 292.
BOTTOM FULLER.

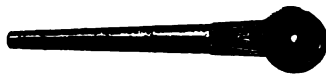


FIG. 295. HEADING TOOL.

Size.	Top Swages.	Bottom Swages.	Top Fullers.	Bottom Fullers.	Round Punches.	Square Punches.	Heading Tools.	Avril Hardies.
$\frac{1}{2}$ inch.	\$0.35	\$0.60	\$0.65	\$0.80	\$0.50	\$0.60	\$0.75	
"	.35	.60	.65	.80	.50	.60	.75	
"	.50	.65	.65	.65	.55	.65	.80	
"	.50	.65	.65	.65	.55	.65	.80	
"	.50	.65	.65	.65	.55	.65	.80	\$0.25
"	.55	.70	.70	.70	.65	.75	1.00	.35
"	.65	.80	.80	.80	.75	.85	1.10	.35
"	.70	.85	.85	.85	.95	1.05	1.25	.40
"	.75	.95	.85	.85	1.00	1.15	1.35	.50
"	.80	1.00	.90	.90				.60
"	.80	1.00	1.15	1.00				.65
"	1.10	1.10	1.15	1.00				
"	1.15	1.15	1.25	1.10				

Larger sizes of any of the above tools furnished to order.



FIG. 296. COLD CHISEL.

Size, 1 in.	$1\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$2\frac{1}{2}$ in.
Price, \$0.45	.50	.60	.75



FIG. 297. HOT CHISEL.

This is the same general style as the cold chisel, but somewhat thinner and sharper.

Size, 1 in.	$1\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$2\frac{1}{2}$ in.
Price, \$0.45	.50	.60	.70



FIG. 298.
SQUARE FLATTER.

Size, 2 in.	$2\frac{1}{2}$ in.	$2\frac{3}{4}$ in.	$3\frac{1}{2}$ in.
Price, \$0.65	.75	1.00	1.20
Size, 3 in.	$3\frac{1}{2}$ in.		4 in.
Price, \$1.35	1.70		2.20

BLACKSMITHS' COUNTERSINK.

(Not illustrated.)

Made in one size; weight, about $2\frac{1}{2}$ lbs.
Price, 55 cts. each.

BLACKSMITHS' CENTRE PUNCH.

(Not illustrated.)

Made in one size; weight, about $2\frac{1}{2}$ lbs.
Price, 55 cts. each.



FIG. 299. ANVIL HARDIE.



FIG. 300. SET HAMMER.

Size, 1 in. 1½ in. 1¾ in. 1¾ in. 2 in.
 Price, \$0.40 .60 .75 1.00 1.35



FIG. 301. CROSS PENE SLEDGE.

We have these in all weights from 6 to 20 lbs. Price per lb., 15 cts.



FIG. 302. STRAIGHT PENE SLEDGE.

We have these in all weights from 6 to 20 lbs. Price per lb., 15 cts.



FIG. 303. STRIKING HAMMER.

These come in weights of from 6 to 12 lbs. Price per lb., 17 cts.



FIG. 304. SPIKE MAUL.

Size, 4 lbs. 4½ lbs. 5 lbs. 5½ lbs. 6 lbs.
 Price, \$0.90 1.00 1.10 1.20 1.30



FIG. 305. NAPPING HAMMER.

Sizes from 4 to 8 lbs., Price per lb., 18 cts.



FIG. 306. CROW BAR.

Crow Bars solid steel, weighing from 12 to 30 lbs., with different styles of points. Price, per lb., 7 cts.

In Fig. 307 and 308 are represented a line of Cold and Cape Chisels, especially adapted for the use of machinists. They are made from best tool steel, and in style and shape are quite superior to the ordinary run of cold chisels usually sold in the stores. The average length is about 8 inches. We recommend these to any who have had trouble in obtaining a first-class Cold or Cape chisel.

COLD.		CAPE.	
Size.	Each.	Size.	Each.
½ in.	\$0.30.	½ in.	\$0.35
¾ "	.35	¾ "	.40
1 "	.35	1 "	.50
1 ½ "	.40	1 ½ "	.60
2 "	.50	2 "	.70
2 ½ "	.55	2 ½ "	.80
3 "	.60	3 "	.90

We also carry a full line of cold chisels of ordinary pattern, made of cast steel of an excellent quality which we recommend for ordinary use.

Size, ½ in. ¾ in. 1 in. 1 ½ in. 2 in. 2 ½ in.
 Each, \$0.18 .20 .20 .25 .30 .35

Size, ½ in. 1 in. 1 ½ in.
 Each, \$0.40 .45 .60

Brick chisels about 18 inches long, of ½ inch Octagon steel, 75 cents each.

FARRIERS' TOOLS.



Heller & Bros. have for the past forty years made a specialty of tools for Horse Shoers. They have studied the wants of this trade, and the tools produced by them are acknowledged to be the most perfectly made, as regards shape, style and quality.

Prices of Heller & Bros' Horse Rasps be found on page 65.

Horse Mouth Rasps, see page 69.



FIG. 309. FARRIERS' CUTTING NIPPER.

Length, 8 in.	10 in.	12 in.	14 in.
Each, \$0.95	1.15	1.35	1.60

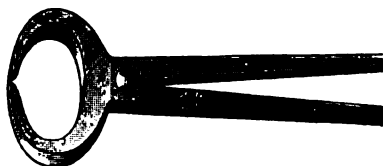


FIG. 310. FARRIERS' PINCERS.

Length, 12 in.	14 in.	16 in.
Each, \$1.15	1.60	2.50



FIG. 311. HOOF PARER.

Length, 14 inch. Price, \$1.60 each.

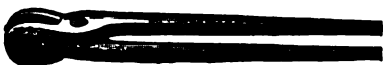


FIG. 312. FORGING TONGS.

Price, 40 cts. each.

FARRIERS' KNIVES, all kinds, 40 cts. each.

TOOL BOX, Little Giant, \$2.00 "

BUTTERIS, " " 1.50 "

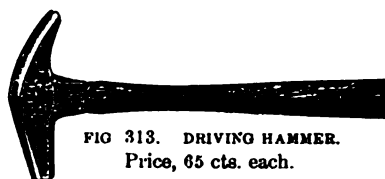


FIG. 313. DRIVING HAMMER.
Price, 65 cts. each.

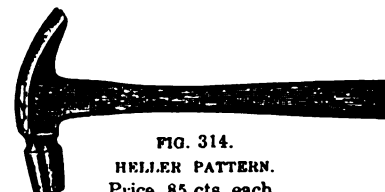


FIG. 314.
HELLER PATTERN.
Price, 85 cts. each.



FIG. 315.

CAT'S HEAD TURNING HAMMER.
Weight, with handle, from 2 to 3 lbs.
Price, \$1.70 each.



FIG. 316.

ROUNDING HAMMER.
Weight, with handle, from 2 to 3 lbs.
Price, \$1.60 each.

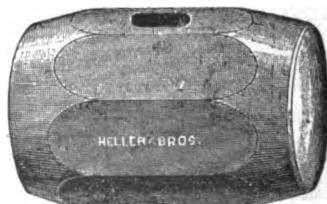


FIG. 317. TURNING SLEDGE HAMMER.

The Turning Sledge Hammers come in weights from 5 to 10 lbs. Price, per lb., 24 cts.

MALLERY'S TURNING & FITTING HAMMERS.
Price, \$1.50 each.

SWAGE BLOCKS.

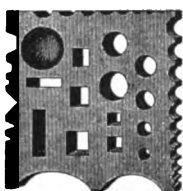
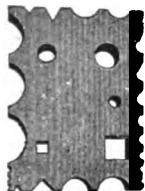


FIG. 318. No. 2. FIG. 319. Nos. 4 & 5.
No. 2, \$4.00. Size, $3\frac{1}{4} \times 11 \times 15$; 125 lbs.
" 4, 5.50. " $4 \times 15 \times 15$; 165 "
" 5, 19.50. " $6 \times 24 \times 24$; 625 "



The Cheney Patent Blacksmith Cone or Taper Mandrel is made with a slot running nearly the whole length, as shown in cut. This is very convenient for holding the ends of iron in bending rings, or when a ring with an eye-bolt is being made, the eye and bolt lie in this slot while the ring is being rounded up.

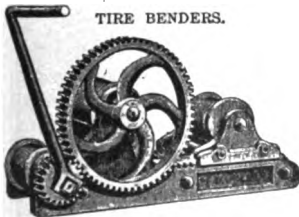
These Mandrels are strengthened inside with cross ties, thereby making this a most desirable Blacksmiths' Cone Mandrel.

The slot is also convenient for handling rings with tongs.

FIG. 320.

No.	Each.	Height.	Diam. at Base.	Diam. at Top.
1	\$3.25	32 in.	8 in.	1 in.
2	6.50	48 "	12 "	1 "
3	7.90	52 "	14 "	1 "
4	11.60	54 "	16 "	2 "

TIRE BENDERS.

FIG. 321. Nos. 2 and $2\frac{1}{2}$.

No. 2 (\$5.60), with gear and pinion, has turned rollers and bearings, and will bend $3\frac{1}{4}$ inch tire or smaller to a circle 30 inches diameter or larger.

No. $2\frac{1}{2}$ (\$6.80) is the same in style as the No. 2, but heavier; will bend 6 inch tire or smaller to a circle 30 inches diameter or larger.

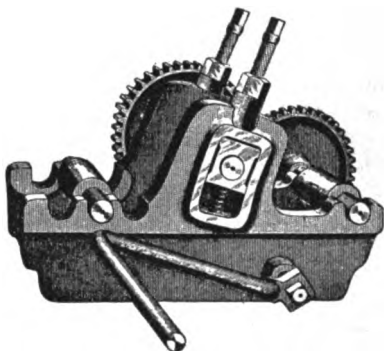


FIG. 322. No. 3.

No. 3 (\$8.40). This Machine is double-gear, very strong and durable, and will bend 5 inch tire or smaller. In bending very heavy tires, two cranks may be used, one on each side.

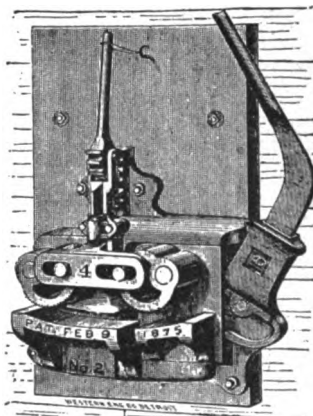


FIG. 323. STODDARD TIRE UPSETTER.

This Tire Upsetter is, in our judgment, by far the best one ever placed upon the market. One man can operate it, and it does not kink the tire.

No. 1, \$11.20, for Tires $\frac{1}{2} \times 2$ in., and less.
" 2, 18.00, " $\frac{1}{4} \times 4$ " " "
" 4, 28.80, " 1×6 " " "

BLACKSMITHS' TONGS.



FIG. 324. STRAIGHT LIPPED TONGS.

No.	1	2	3	4	5
Length, 18 in.	20 in.	22 in.	24 in.	26 in.	
Each,	\$0.30	.40	.50	.60	.70



FIG. 325. BOLT TONGS.

No.	1	2	3	4
Length, 18 in.	20 in.	22 in.	24 in.	26 in.
Each,	\$0.45	.55	.70	.80

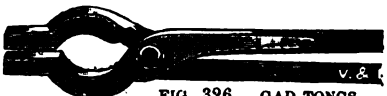


FIG. 326. GAD TONGS.

No.	1	2	3	4
Length, 18 in.	20 in.	22 in.	24 in.	26 in.
Each,	\$0.40	.50	.65	.75

FIG. 327. PICK UP TONGS.
Length, 24 inches. Price, 65 cents.

TUYERE IRONS.

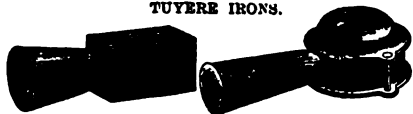


FIG. 328. BOX. FIG. 329. DUCK'S NEST.

No.	1	2	3
Box Tuyere Iron,	\$0.70 light.		
" 3	"	1.15 ext. heavy.	
" 1 Duck's Nest,	\$0.65 light.		
" 3	"	1.00 extra heavy.	

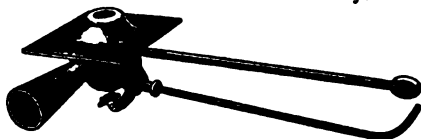


FIG. 330. WARREN'S. Price, \$2.00.

The Warren Patent Tuyere Iron is simple, and easily adjusted. The blast is regulated by simply revolving the ball, which has three unequal sides. Open the bottom valve and all cinders and ashes drop out.

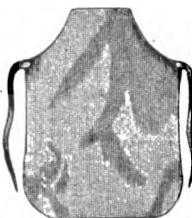


FIG. 331. BLACKSMITHS' APRON.

No.	Sheep Skin.	Horse Hide.
1	\$1.15	\$1.60
2	1.35	1.75
3	1.50	1.95
4	1.75	2.25

SIZES.

No.	1	2	3	4
24 x 30				
26 x 34				
28 x 38				
30 x 42				



FIG. 332.

BLACKSMITHS' BELLOW.

The size of Bellows as given in this list is the measurement in width, can furnish to order what is known as an "extra long" up to 50 inches.

Size	Price
28 inch,	\$6.00
32 "	7.00
34 "	8.00
36 "	9.00
38 "	10.00
40 "	11.50
42 "	13.50
44 "	16.00

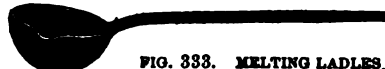


FIG. 333. MELTING LADLES.

These melting ladles are made of heavy wrought steel, and although very much higher in price than the ordinary wrought iron or malleable ladles, they are well worth the difference.

Diam.	2 1/2 in.	3 in.	4 in.	5 in.
Each,	\$0.25	.30	.45	.50
Diam.	6 in.	7 in.	8 in.	9 in.
Each,	\$0.60	1.40	1.75	3.00

The 7, 8 and 9 inch sizes are extra heavy and strong.

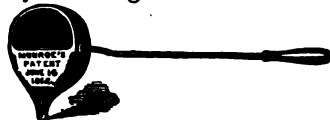


FIG. 334. MONROE LADLE.

We carry in stock but one size of the Monroe Ladle, with a capacity of about 1 lb. Each. 35 cts. Can furnish them in larger sizes up to 25 lbs. capacity.

MELTING POTS. (Not illustrated.)

Diam.	6 in.	8 in.	9 in.	10 in.	12 in.
Each,	\$0.55	.80	1.00	1.50	2.25

BUFFALO FORGES.**FOR BLACKSMITHS AND MACHINISTS.**

We have in the past usually kept two lines of Portable Forges in stock, the "Buffalo" and some other make. Our reason was, that the Buffalo forges were a little higher in price than others.

Upon considering the matter, we have decided that the difference in price is so comparatively small, and the Buffalo

Forges so much superior to most others, that we have concluded to carry the line of Buffalo forges exclusively. We have sold them for upwards of fifteen years, and for strength, durability, powerful blast and the ease with which they are operated, we can fully recommend them.

We present here quite an extensive variety in Portable, Stationary and Power forges.



FIG. 335. No. 7, \$7.20.



FIG. 336. No. 8, \$8.10.

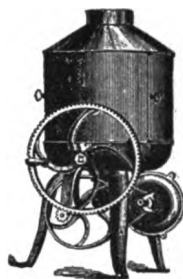


FIG. 337. No. 9, \$9.00.

The No.'s 7, 8 and 9 are intended for light work; very compact, and can easily be moved about. Height to hearth, 15 inches; diameter of hearth, 15 inches; diameter of fan, 6 inches; weight from 40 to 55 lbs.



FIG. 338. No. 5, \$10.80.

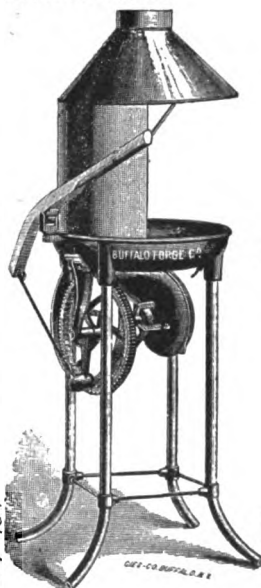


FIG. 339. No. 4, \$12.18.

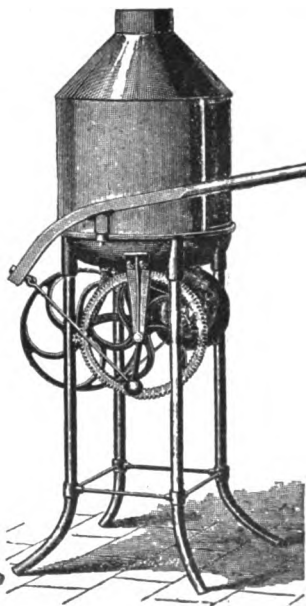


FIG. 340. No. 6, \$18.50.

Nos. 4, 5 and 6 are especially adapted for the use of Machinists, Model-makers, Plumbers, Tinsmiths, Jewelers, etc. The No. 5, Fig. 338, is used largely for Bridge, Boiler and Tank work. The No. 6, Fig. 340, has the closed hood with large sliding door, preventing the escape of sparks, fumes and smoke when starting the fire. These sizes will produce a welding heat on iron $1\frac{1}{4}$ inches in diameter in five minutes, and on heavier work if required, but on account of size of fire-place and general capacity, they are recommended for the work as specified. Height to hearth, 33 inches; diameter of hearth, 18 inches; diameter of fan, 7 inches; weight, from 70 to 80 lbs.



FIG. 341. No. 3. \$16.20.

The Nos. 1, 2 and 3 are of the same general type as the others, larger and heavier. The No. 2 we do not illustrate; it is the same style as No. 3, with full closed hood, and the price is \$1.00 more than that of No. 1. These sizes will produce a welding heat on $2\frac{1}{4}$ and 3 inch iron in from five to ten minutes, and will do heavier work if required. Height to hearth, 29 inches; size of hearth, 21×27 inches; diameter of fan, 10 inches; weight, from 140 to 150 lbs.

Every Buffalo Forge is sold upon its merits and guaranteed to give entire

satisfaction. The best steel shafts are used on all, and those furnished with hoods have the metal work built of heavy steel plate, which is more durable than sheet iron. All running gear is heavy, strong, and easily operated.

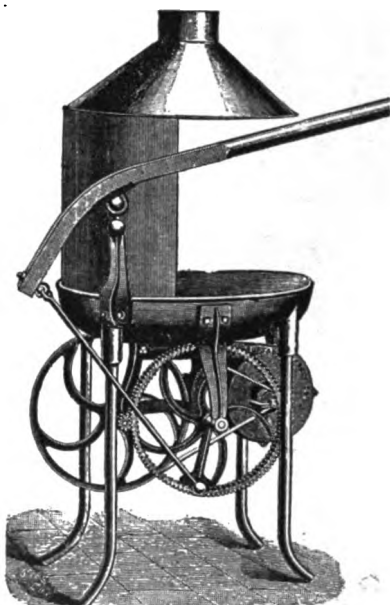
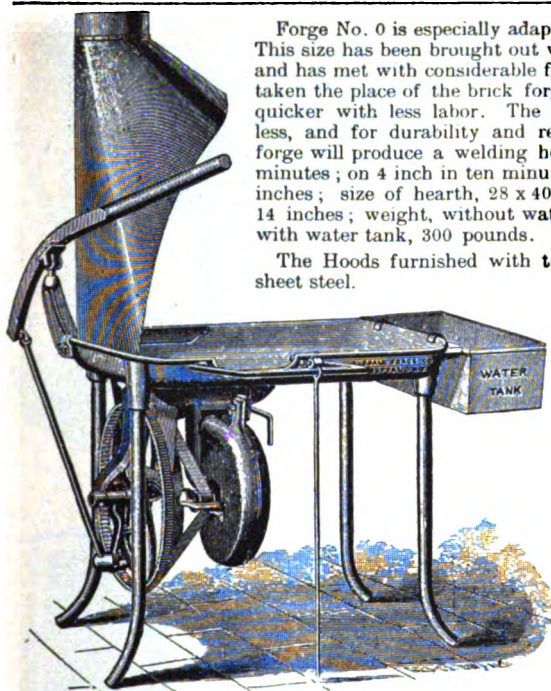


FIG. 342. No. 1. \$18.00.



FIG. 343. No. 10. \$14.40.

The Buffalo Railroad and Bridge builders' Forge, No. 10, Fig. 343, has the same capacity as the No. 5, described on page 81. It is the most desirable portable forge for Ship and Bridge builders and Railroad Repair work.



Forge No. 0 is especially adapted for blacksmiths' work. This size has been brought out within the past few years, and has met with considerable favor. It has very largely taken the place of the brick forge and bellows. It heats quicker with less labor. The initial cost is very much less, and for durability and reliability, it excels. This forge will produce a welding heat on 3 inch iron in five minutes; on 4 inch in ten minutes. Height to hearth, 30 inches; size of hearth, 28 x 40 inches; diameter of fan, 14 inches; weight, without water tank, 250 pounds, and with water tank, 300 pounds.

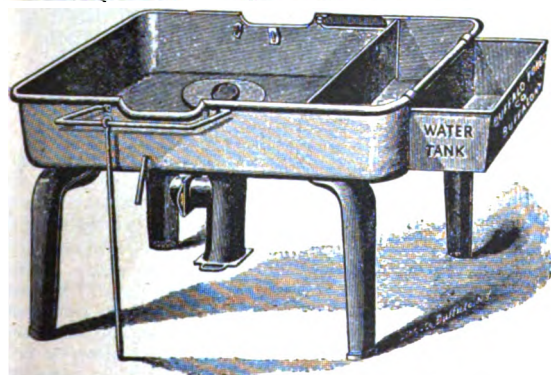
The Hoods furnished with these forges are made of sheet steel.

FIG. 344. No. 0.

Price, \$24.30.

Without Water Tank,

\$32.50.



The Buffalo Stationary Blast Forge, Fig. 345, is especially intended for heavy work. Its design combines a coal box and water tank; is also provided with a blast gate, over which the operator has perfect control, where an independent Blower or power fan blast is used for supplying the blast, and from this, the term "stationary blast" is derived, although, like the others, they are easily portable.

FIG. 345. STATIONARY BLAST FORGE. No. 00s.

No. 00s	\$21.60,	fire pan, 38 x 51;	coal pan, 27 x 9;	water pan, 36 x 9;	w'g't, 425 lbs.
" 03	37.80	" " 61 x 48	" " 18 x 12	" " 29 x 12	" 720 "
" 02	18.40	" " 26 x 36	" " 27 x 9	no water pan.	" 325 "
" 0s	10.80	" " 38 x 40	no coal tank	no water tank.	" 160 "
" 1s	8.10	" " 21 x 37	" " "	" " "	" 80 "

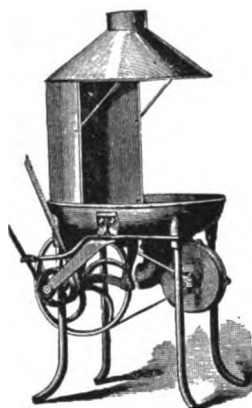


FIG. 346. No. 1. POWER FORGE.

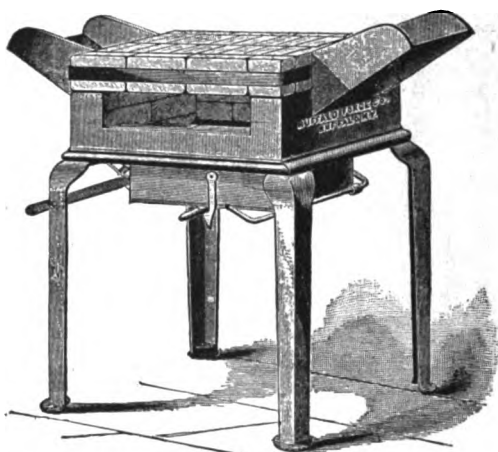


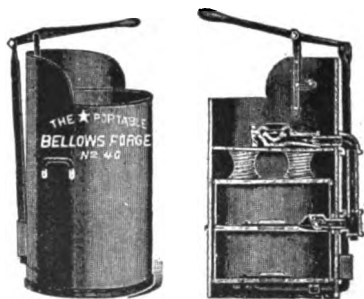
FIG. 347. HEATING FORGE. No. 32.

The Portable Power Forges are desirable in many places. The No. 0 Power Forge is similar in dimensions to the No. 0 Forge, Fig. 344. The No. 1 Power to the No. 1, Fig. 342. Price of No. 0, with water tank, \$26.10; without, \$25.30. Price of No. 1, \$20.25.

Heating Forges, Fig. 347, are designed for heating a great variety of work, such as rivets, bolts, rods, axes, band iron, etc., and also for cutting, bending and forging purposes. Are especially adapted to heating a number of pieces at one time, thus keeping the mechanic fully supplied with heated work, to be operated upon continuously. Are largely used in connection with steam hammers, riveting machines, etc. All have double shaking grates and blast gate for regulating the supply. The prices are for forge complete without brick.

No. 30	\$24.50	Grate surface,	8 x 10 in.
" 31	31.50	" "	12 x 12 "
" 32	42.00	" "	13 x 22 "
" 33	42.00	" "	19 x 20 "
" 34	52.50	" "	12 x 44 "
" 35	38.50	" "	8 x 22 "
" 36	63.00	" "	18 x 40 "
" 38	52.50	" "	24 x 24 "

The Star Portable Bellows Forge, Fig. 348, is made especially for boiler makers, iron ship builders, bridge and tank builders, etc., etc.

FIG. 348. Price, \$24.00.
STAR PORTABLE BELLOWES FORGE.

The size of hearth is 19 inches in diameter, and it weighs 100 pounds. We have sold a number of different makes, and from our experience we believe this is easily the best made of its type.

Bellows forges are generally looked upon as being "old fashioned," but we have lots of customers who have used both the fan and bellows forges, and who very much prefer the latter. We know of bellows forges that have been in constant use upwards of thirty years, and are still in use, and giving satisfaction.

The Bullock Company make a very complete line of bellows forges in all styles and sizes. Would be pleased to name prices on other styles if desired.

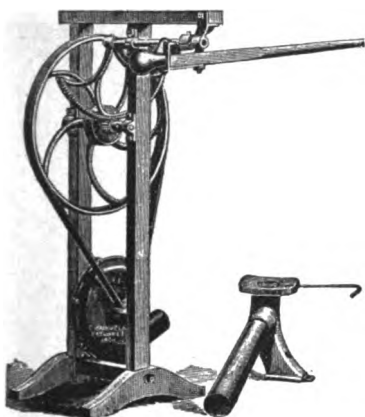


FIG. 349 No. 3. HAND BLOWER.

Price, without Tuyere, \$12.40.

" with Tuyere, 13.50.

No. 3, Fig. 349, is the standard type of Hand Blower most largely employed in blacksmith shops, and there are doubtless more of this style in daily use in general blacksmith shops, than any other. It has a 14 inch fan.

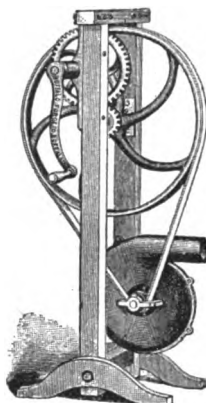


FIG. 351. No. 5. HAND BLOWER.

Price, without Tuyere, \$9.70.

" with Tuyere, 10.80.

No. 5, Fig. 351, is designed to meet the requirements where, for convenience, a crank blower is desirable. In its construction is embodied the patented ratchet crank, which does not continue to revolve when released, but falls in the position

indicated in the cut, which is the most convenient for starting. It has a 14 inch fan, and with thirty turns of crank per minute, will blow a blast strong enough to heat 3 to 4 inch iron in from 5 to 10 minutes.

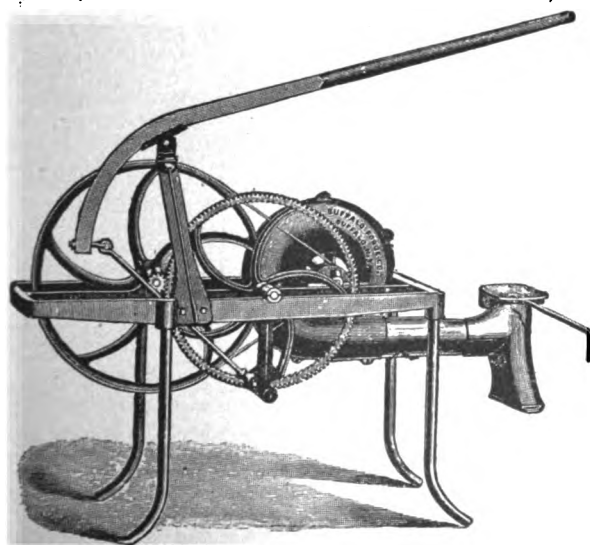


FIG. 350. No. 4. HAND BLOWER.

Blacksmiths' Hand Blower No. 4, Fig. 350 is the largest one we know of being made. Is designed for flange fires, boiler shops, and extra heavy work in ship and blacksmith shops. Will perform heavier work than any other Hand Blower built. It has a 17 inch fan. Price, without Tuyere, \$18.40; with Tuyere, \$19.50.

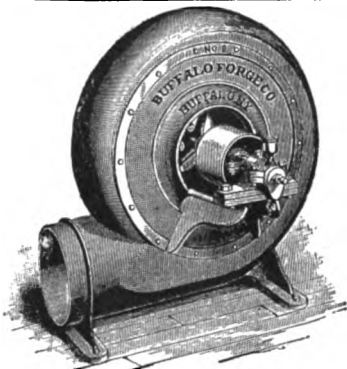


FIG. 352. POWER BLOWER.

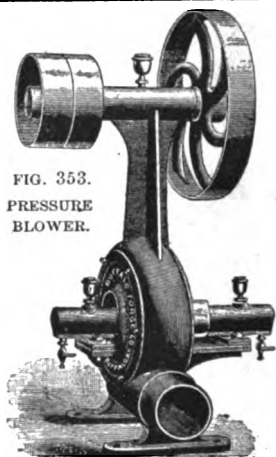
Fan Blowers and Exhausters are now made in almost endless variety, comprising Steam Fans, Fan Wheels, Hot Blast Heaters, Lumber Dryers, Pressure and Volume Blowers, etc., etc.

We show here, Fig. 352, the Buffalo Volume Blower, which is adapted to the blowing of forge fires, puddling and heating furnaces, and in fact for all general purposes. We consider the Buffalo Blower as being, at least, as good as any others; they are well made, and we guarantee them to be right in all respects.

No.	Price.	Height.	Diam.	Outlet.
1B	\$15.00	15 in.	5 in.	
2B	18.75	19 "	6 "	
3B	24.75	25 "	7 1/2 "	
4B	33.00	29 "	9 "	
5B	41.25	32 "	10 1/2 "	
6B	52.50	38 "	12 "	
7B	67.50	43 "	14 "	
8B	112.50	48 "	16 1/2 "	

The Buffalo "B" Volume Exhaust Fans are used largely for removing smoke and gas generated in blacksmith shops, chemical works and manufacturing establishments in general; also for removing the dust from emery and other polishing wheels, buffing machines, sand wheels and similar work. They can be built when so ordered, with copper or bronze blast wheels and with the shells coated inside and outside with asphaltum, to withstand the destructive results of acid fumes found in chemical works, sugar refineries, drying rooms, etc., etc.

Our line of Exhaust Fans comprises the same numbers and sizes given above, and the prices are the same for either Blowers or Exhausters.

FIG. 353.
PRESSURE
BLOWER.

The cut, Fig. 353, shows a No. 1 pressure Blower, having the countershaft affixed, made only in one size. The height of Blower is 19 1/2 in. Price, as shown in cut, \$16.00; without countershaft, \$9.60.

FIG. 354.
SMALL
BLOWER.
No. 00.

We sell a goodly number of these for experimental purposes, as the price is low. Are not as well finished or as durable as our regular line. The No. 0 is sufficient to blow one forge fire. No. 1 three forge fires of average size.

These small Blowers can also be arranged for exhausting purposes, at an extra cost of \$1.50 each.

No. 00,	\$6.00,	8 in. high,	Outlet, 2 1/2 in.
" 0,	7.50,	12 "	" 3 "
" 1,	10.50,	18 "	" 4 1/2 "

IMPROVED BLAST GATES.

These gates are used for opening and closing Blast Pipes; they are simple in form, made of cast iron with steel slide. We print here a list of sizes and prices.

Size, 2 in.	2 1/2 in.	3 in.	4 in.	5 in.	6 in.
Price, \$0.80	1.00	1.20	1.60	1.80	2.00
Size, 8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
Price, \$2.80	4.00	5.20	6.40	9.60	12.80



FIG. 355. MACHINIST TOOL CHEST.

The Tool Chest shown in Fig. 355 is especially designed for Machinists and Mechanics using small tools. They are made of black walnut, cherry and oak, but we carry them in stock, only in black walnut, as they are the most saleable; can furnish them in the other woods. Are nicely finished with high polish; are provided with Yale locks having two keys, and have nickel-plated drawer pulls of neat design.

The No. 1 Chest is about suitable for holding Draughtsmen's and Watchmakers' tools, as the table of dimensions will show.

OUTSIDE DIMENSIONS.

	Pric. Each.	Length.	Width.	Height.
No. 1,	\$6.50	12 in.	9½ in.	8½ in.
" 2,	8.50	18½ "	11½ "	10 "
" 3,	9.00	21 "	14 "	13½ "

	No. 1.			No. 2.			No. 3.		
1st Drawer,	9½ in.	6½ in.	1½ in.	15½ in.	8½ in.	1 in.	18 in.	10½ in.	1½ in.
2d "	9½ "	6½ "	1½ "	15½ "	8½ "	1 "	18 "	10½ "	1½ "
3d "	9½ "	6½ "	1½ "	15½ "	8½ "	1 "	18 "	10½ "	1½ "
4th "	9½ "	6½ "	1½ "	15½ "	8½ "	1½ "	18 "	10½ "	2½ "
Space under lid,	1½ in. deep,			2½ in. deep,			2½ in. deep.		
Under Bottom Drawer,	½ in. deep,			1½ " "			1½ " "		

ODDS AND ENDS.

We often have customers come in our store and while buying goods and inspecting stock exclaim, "Well! There is just the thing I want; have been looking for it a long while, but as it wasn't in your catalogue, I didn't know you had it."

Now, while we think this catalogue is the most complete and comprehensive one ever issued, it does not by any means contain descriptions, etc., of all the goods we carry in stock or can obtain, in fact the matter of new tools alone is a large item, as there is not a week passes that we do not add new goods to our already very extensive stock. Inventors and those making patented articles often require special screws, pins, washers and nails, special sizes of wire, steel, brass, metals, etc., etc.

We are in constant communication with manufacturers who make a specialty of these odd goods, and who, of course, can make the same, and furnish the materials made up, for less money than it

would cost an ordinary shop to "rig up."

We have a force of clerks whose business it is to look up and answer all inquiries, and we earnestly request all those who wish for any information not contained here to write us and we will cheerfully and promptly give any information in our possession. It will cost you but a few cents, and may save you dollars.

We are in some cases prevented by lack of space or proper cuts, from giving as complete descriptions and illustrations of tools as we would like. If any tools or articles are not sufficiently described, we can, in nearly all cases furnish illustrations and descriptive matter, that will be helpful to the intending buyer; and can often furnish the manufacturers' catalogue, which generally tells just what a tool will do (and sometimes we are afraid a little more). In fact if you want anything, from a pair of dies for an old screw plate to a Milling Machine or Gear Cutter, write to us.

TWIST DRILLS.

Twist Drills were first manufactured for the market nearly thirty years ago. And, singular as it may seem, it was nearly fifteen years before their merits were well enough known—or appreciated—to warrant dealers carrying them in

stock. There are now perhaps, a dozen firms engaged in manufacturing Twist Drills.

The Morse Twist Drill Co. are the pioneers in this line, and we consider the goods made by them superior to all others, as regards excellence and uniformity.

The genuine Morse Twist Drills are a little higher in price than any of the other makes, but the difference is trifling, and we think they are well worth it.

FIG. 356. TAPER SHANK DRILL.

FIG. 357. TAPER LENGTH STRAIGHT SHANK DRILL.

Fig. 356, Taper Shank Drill, is the style most commonly used in machine shops, more especially in sizes above $\frac{1}{2}$ in.

In the last few years, however, owing to the more general introduction of larger size Drill Chucks than were formerly used, we have sold a great many of the Taper Length Straight Shank Drills, Fig. 357. Very few of this style are sold, however, under $\frac{1}{2}$ in.

Diameter.	Each.	Length.		
$\frac{1}{16}$	\$0.30	$6\frac{1}{2}$	SHANKS OF THESE SIZES ARE Number 1, Morse Taper.	No. 3. Morse Taper.
$\frac{1}{8}$	.30	$6\frac{1}{2}$		
$\frac{3}{16}$	.30	$6\frac{1}{2}$		
$\frac{1}{4}$	.33	$6\frac{1}{2}$		
$\frac{5}{16}$	.35	$6\frac{1}{2}$		
$\frac{3}{8}$	.38	$6\frac{1}{2}$		
$\frac{7}{16}$	.40	$6\frac{1}{2}$		
$\frac{1}{2}$	.43	7		
$\frac{9}{16}$	.45	$7\frac{1}{2}$		
$\frac{5}{8}$	.48	$7\frac{1}{2}$		
$\frac{11}{16}$	.50	$7\frac{1}{2}$	Number 2. Morse Taper.	Number 4. Morse Taper.
$\frac{3}{4}$	.55	8		
$\frac{7}{8}$	.60	$8\frac{1}{2}$		
$\frac{1}{2}$	.65	$8\frac{1}{2}$		
$\frac{1}{2}$	.70	$8\frac{1}{2}$		
$\frac{1}{2}$	.75	9		
$\frac{1}{2}$	.80	$9\frac{1}{2}$		
$\frac{1}{2}$	.85	$9\frac{1}{2}$		
$\frac{1}{2}$	.93	$9\frac{1}{2}$		
$\frac{1}{2}$	1.00	$9\frac{1}{2}$		
$\frac{1}{2}$	1.08	10	No. 3. Morse Taper.	Number 5. Morse Taper.
$\frac{1}{2}$	1.15	$10\frac{1}{2}$		
$\frac{1}{2}$	1.23	$10\frac{1}{2}$		
$\frac{1}{2}$	1.30	$10\frac{1}{2}$		
$\frac{1}{2}$	1.38	$10\frac{1}{2}$		
$\frac{1}{2}$	1.45	$10\frac{1}{2}$		
$\frac{1}{2}$	1.50	11		
$\frac{1}{2}$	1.60	$11\frac{1}{2}$		
$\frac{1}{2}$	1.70	$11\frac{1}{2}$		
Diameter.	Each.	Length.		
$\frac{1}{16}$	\$1.80	$11\frac{1}{2}$	No. 3. Morse Taper.	No. 3. Morse Taper.
$\frac{1}{8}$	1.90	$11\frac{1}{2}$		
$\frac{3}{16}$	2.00	$11\frac{1}{2}$		
$\frac{1}{4}$	2.10	12		
$\frac{5}{16}$	2.20	$12\frac{1}{2}$		
$\frac{3}{8}$	2.35	$12\frac{1}{2}$		
$\frac{7}{16}$	2.38	$14\frac{1}{2}$		
$\frac{1}{2}$	2.40	$14\frac{1}{2}$		
$\frac{9}{16}$	2.50	$14\frac{1}{2}$		
$\frac{5}{8}$	2.60	$14\frac{1}{2}$		
$\frac{11}{16}$	2.70	$14\frac{1}{2}$	Number 4. Morse Taper.	Number 4. Morse Taper.
$\frac{3}{4}$	2.80	$14\frac{1}{2}$		
$\frac{7}{8}$	2.90	$14\frac{1}{2}$		
$\frac{1}{2}$	3.00	15		
$\frac{1}{2}$	3.04	$15\frac{1}{2}$		
$\frac{1}{2}$	3.38	$15\frac{1}{2}$		
$\frac{1}{2}$	3.52	$15\frac{1}{2}$		
$\frac{1}{2}$	3.76	$15\frac{1}{2}$		
$\frac{1}{2}$	6.00	$15\frac{1}{2}$		
$\frac{1}{2}$	6.24	$15\frac{1}{2}$		
$\frac{1}{2}$	6.48	$15\frac{1}{2}$	Number 5. Morse Taper.	Number 5. Morse Taper.
$\frac{1}{2}$	6.72	16		
$\frac{1}{2}$	6.88	$16\frac{1}{2}$		
$\frac{1}{2}$	7.04	$16\frac{1}{2}$		
$\frac{1}{2}$	7.20	$16\frac{1}{2}$		
$\frac{1}{2}$	7.36	$16\frac{1}{2}$		
$\frac{1}{2}$	7.48	$16\frac{1}{2}$		
$\frac{1}{2}$	7.60	$16\frac{1}{2}$		
$\frac{1}{2}$	7.72	$16\frac{1}{2}$		
$\frac{1}{2}$	7.84	$16\frac{1}{2}$		
$\frac{1}{2}$	8.16	$16\frac{1}{2}$	Number 5. Morse Taper.	Number 5. Morse Taper.
$\frac{1}{2}$	8.48	17		
$\frac{1}{2}$	8.96	17		
$\frac{1}{2}$	9.60	17		
$\frac{1}{2}$	10.24	$17\frac{1}{2}$		
$\frac{1}{2}$	10.88	$17\frac{1}{2}$		
$\frac{1}{2}$	11.52	18		
$\frac{1}{2}$	12.00	$18\frac{1}{2}$		
$\frac{1}{2}$	12.48	18		

No. TAPER SHANK DRILLS IN SETS.

1,	\$10.00,	$\frac{1}{8}$ to $\frac{1}{2}$ inch,	varying by 16ths.
2,	17.25,	$\frac{1}{8}$ " $\frac{1}{4}$ " " " 16ths.	
3,	21.00,	$\frac{1}{8}$ " $\frac{1}{2}$ " " " 32ds.	
		$\frac{1}{8}$ " $\frac{1}{2}$ " " " 16ths.	
4,	65.50,	$\frac{1}{8}$ " $\frac{1}{2}$ " " " 32ds.	
		$\frac{1}{8}$ " $\frac{1}{2}$ " " " 16ths.	
11,	120.00,	$\frac{1}{8}$ " $\frac{1}{2}$ " " " 32ds.	



FIG. 358. No. 100. MORSE TAPER SOCKET.

Fig. 358 is the style of Socket most commonly sold. The Shank is left blank so that it can be turned and fitted to any size or shape desired.

No. 1,	\$0.95,	holds $\frac{1}{8}$ to $\frac{1}{2}$ inch inclusive
" 2,	1.45,	" " " " " "
" 3,	2.00,	" " " " " "
" 4,	3.20,	" " " " " "
" 5,	6.00,	" " " " " "

Diam. of	Nos. 1	2	3	4	5
Blank Ends	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$ in.
Entire Length,	7	8	10	13	15 "



FIG. 359. No. 100a. MORSE TAPER SOCKET.

These Sockets are similar to the one mentioned above, except that the Shanks are fitted to different tapers.

No. 1, \$1.60, with Shank fitted to No. 2 or No. 3 Morse Taper.

No. 2, \$2.00, Shank fitted to No. 3 Taper.

" 3,	2.60,	" " " " 4 "
" 4,	3.85,	" " " " 5 "



FIG. 360. No. 100b. MORSE SLEEVE SOCKET.

No. 1, \$1.45, fitted to Nos 2 or 3 Taper.

" 2,	1.90,	" " " " 3 "
" 3,	2.40,	" " " " 4 "
" 4,	3.50,	" " " " 5 "

In the following table we give the dimensions of Shanks of Taper Shank Drills, obtained by measuring shanks:

	Small End.	Large End.	Lgth. of Taper
No. 1,	.365	.542	$2\frac{1}{2}$ inch.
" 2,	.572	.797	$3\frac{1}{2}$ "
" 3,	.772	1.025	$3\frac{1}{2}$ "
" 4,	1.021	1.303	$4\frac{1}{2}$ "
" 5,	1.480	1.756	6 "

STRAIGHT SHANK DRILLS.

Diameter.	Each.	Dozen.	Lgth.
$\frac{1}{16}$	\$0.05	\$0.50	$2\frac{1}{2}$
$\frac{1}{8}$	.06	.55	$2\frac{1}{2}$
$\frac{1}{4}$	.06	.60	$2\frac{1}{2}$
$\frac{3}{8}$	.07	.65	$2\frac{1}{2}$
$\frac{1}{2}$	.07	.78	3
$\frac{5}{8}$	.08	.80	$3\frac{1}{2}$
$\frac{3}{4}$	.09	.90	$3\frac{1}{2}$
$\frac{7}{8}$	.10	1.00	$3\frac{1}{2}$
$1\frac{1}{8}$	.11	1.10	$3\frac{1}{2}$
$1\frac{1}{4}$	.12	1.20	$3\frac{1}{2}$
$1\frac{3}{8}$	.13	1.38	$3\frac{1}{2}$
$1\frac{1}{2}$	.15	1.45	$3\frac{1}{2}$
$1\frac{3}{4}$	.16	1.58	4
$2\frac{1}{8}$	.17	1.70	$4\frac{1}{2}$
$2\frac{1}{4}$	.18	1.83	$4\frac{1}{2}$
$2\frac{3}{8}$	.20	1.95	$4\frac{1}{2}$
$2\frac{1}{2}$	.21	2.10	$4\frac{1}{2}$
$2\frac{7}{8}$	.23	2.25	$4\frac{1}{2}$
$3\frac{1}{8}$	.24	2.40	$4\frac{1}{2}$
$3\frac{1}{4}$	.26	2.55	$4\frac{1}{2}$
$3\frac{3}{8}$	.27	2.70	5
$3\frac{1}{2}$	.29	2.85	$5\frac{1}{2}$
$3\frac{7}{8}$	.30	3.00	$5\frac{1}{2}$
$4\frac{1}{8}$	.32	3.20	$5\frac{1}{2}$
$4\frac{1}{4}$	.34	3.40	$5\frac{1}{2}$
$4\frac{3}{8}$	.36	3.60	$5\frac{1}{2}$
$4\frac{1}{2}$	.38	3.75	$5\frac{1}{2}$
$4\frac{7}{8}$	.39	3.88	$5\frac{1}{2}$
$5\frac{1}{8}$	.40	4.00	6

FIG. 361.

LETTER SIZE DRILLS.

Letter Size Drills are based on the P. S. Stubs' drill rod list of sizes; the decimal sizes are given in table. These Drills are used generally, when a size is desired that is between the 64ths in the regular drill list. For example, the letter "E" is $\frac{1}{8}$ inch, while the letter "H" is $\frac{1}{4}$ inch, the two letters "F" and "G," being between these sizes.

Size.	Decimal.	Each.	Dozen.	Lgth.
A $\frac{1}{16}$ in.	.234	\$0.15	\$1.45	$3\frac{1}{2}$
B	.238	.15	1.50	"
C	.243	.16	1.55	"
D	.246	.16	1.60	"
E $\frac{1}{8}$ in.	.250	.17	1.65	"
F	.257	.17	1.70	$4\frac{1}{2}$
G	.261	.18	1.75	"
H $\frac{1}{4}$ in.	.266	.18	1.80	"
I	.272	.19	1.85	"
J	.277	.19	1.90	"
K $\frac{3}{8}$ in.	.281	.20	1.95	"
L	.290	.20	2.00	"

(Continued on page 90.)

LETTER SIZE DRILLS—(Continued.)

Size.	Decimals.	Each.	Dosen.	Length.
M $\frac{1}{16}$ in.	.295	\$0.21	\$2.05	$4\frac{1}{2}$
N	.302	.31	2.10	$4\frac{1}{2}$
O $\frac{1}{8}$ in.	.316	.32	2.15	$4\frac{1}{2}$
P $\frac{3}{16}$ in.	.332	.33	2.30	$4\frac{1}{2}$
Q	.332	.33	2.30	$4\frac{1}{2}$
R $\frac{1}{4}$ in.	.339	.34	2.40	$4\frac{1}{2}$
S	.348	.35	2.50	$4\frac{1}{2}$
T $\frac{5}{16}$ in.	.358	.36	2.60	$5\frac{1}{2}$
U	.368	.37	2.70	5
V $\frac{3}{8}$ in.	.377	.38	2.80	5
W $\frac{7}{16}$ in.	.386	.39	2.90	$5\frac{1}{2}$
X	.397	.30	3.00	$5\frac{1}{2}$
Y $\frac{1}{2}$ in.	.404	.39	3.20	$5\frac{1}{2}$
Z	.413	.34	3.40	$5\frac{1}{2}$

NUMBER SIZE DRILLS.

Number Size Drills are based on the Stubbs' steel wire or drill rod gauge. For sizes in decimals see Drill Rod list.

Gauge.	Each.	Dosen.	Length.
Nos. 1 to 5	\$0.12	\$1.18	4
" 6 " 10	.11	1.13	$3\frac{1}{4}$
" 11 " 15	.11	1.05	$3\frac{1}{4}$
" 16 " 20	.10	.98	$3\frac{1}{4}$
" 21 " 25	.09	.88	$3\frac{1}{4}$
" 26 " 30	.08	.78	$2\frac{1}{4}$
" 31 " 35	.07	.70	$2\frac{1}{4}$
" 36 " 40	.06	.63	$2\frac{1}{4}$
" 41 " 45	.06	.55	$2\frac{1}{4}$
" 46 " 60	.05	.48	$2\frac{1}{4}$ to $1\frac{1}{2}$
" 61 " 70	.05	.45	$1\frac{1}{2}$
" 71 " 80	.05	.50	$1\frac{1}{2}$ to $\frac{1}{2}$

STRAIGHTWAY DRILLS.

Fig. 362 represents the Straightway Drill, also known as the Farmer or Universal Drill. This is an extra serviceable tool for use in brass or the softer metals, drilling them expeditiously and accurately without drawing or winding into the pieces being drilled.

We carry them in stock only in the Straight Shank style from $\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths of an inch. The price of these is the same as Twist Drills and we can furnish them in any size or style of shank.

STRAIGHT SHANK DRILLS IN SETS.

We sell a great many sets of straight drills, they are furnished in various assortments. The price of each set includes a finished hardwood block drilled to

accommodate each size separately, and plainly stamped.

No. 5, \$5.00, $\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths.
 " 6, 2.70, $\frac{1}{16}$ to $\frac{1}{2}$ inch by 32ds.
 " 7 4.95, from No. 60 to $\frac{1}{2}$ inch.
 " 8, 4.05, number sizes 1 to 60.
 " 9, 2.15, half set alternate, Nos. 1 to 59.
 No. 10, \$2.45, Jewelers' set, 36 drills, No. 30 ($\frac{1}{8}$ inch) to No. 65. Mounted in mahogany case with cap.



FIG. 363. COE'S DRILL.

The Coe's Drill, Fig. 363 takes its name from the manufacturer of a line of Drill Presses. These drills have straight round shanks about $\frac{1}{8}$ inch diameter ($\frac{1}{8}$). And all the sizes above $\frac{1}{8}$ are of uniform length, 6 inch over all.

Diam.	Each.	Diam.	Each.
$\frac{1}{16}$	\$0.28	$\frac{1}{8}$	\$0.68
$\frac{1}{8}$	.30	$\frac{3}{16}$	.68
$\frac{3}{16}$	.30	$\frac{1}{2}$	.73
$\frac{1}{4}$	.35	$\frac{5}{8}$	.73
$\frac{5}{8}$	.35	$\frac{3}{4}$	.80
$\frac{3}{4}$	.38	$\frac{7}{8}$	.80
$\frac{7}{8}$	.38	$1\frac{1}{8}$	.90
$1\frac{1}{8}$	.43	1	.90
$1\frac{1}{4}$	.43	$1\frac{1}{4}$	1.00
$1\frac{3}{4}$	.45	$1\frac{3}{4}$	1.00
$2\frac{1}{4}$	.45	$2\frac{1}{4}$	1.10
$2\frac{3}{4}$	.48	$2\frac{3}{4}$	1.10
$3\frac{1}{4}$	.48	$3\frac{1}{4}$	1.13
$4\frac{1}{4}$	.50	$4\frac{1}{4}$	1.15
$5\frac{1}{4}$	.50	$5\frac{1}{4}$	1.18
$6\frac{1}{4}$	.58	$6\frac{1}{4}$	1.20
$7\frac{1}{4}$	.53	$7\frac{1}{4}$	1.45
$8\frac{1}{4}$	.58	$8\frac{1}{4}$	1.60
$9\frac{1}{4}$	.58	$9\frac{1}{4}$	1.70
$10\frac{1}{4}$	.63	$10\frac{1}{4}$	1.95
$11\frac{1}{4}$	.63		

We would call attention to the fact that the Coe's (Fig. 363) and Prentice (Fig. 364) Drills on account of their being shorter, are considerably less in price than the regular Taper Shank and Taper Length Straight Shank Drills. And where a drill is required for special or occasional use, it is quite a saving to use these in place of the others.

Prentice Drills, Fig. 364, are quite similar to the Coe's Drill, the difference being that the shanks on all sizes are $\frac{1}{8}$ inch in diameter.

FIG. 362.

FIG. 364. NO. 112 PRENTICE DRILLS.

Diam.	Each.	Diam.	Each.
$\frac{1}{8}$	\$0.23	$\frac{1}{4}$	\$0.38
$\frac{1}{16}$	.25	$\frac{3}{16}$	.39
$\frac{1}{32}$	.25	$\frac{1}{2}$	.40
$\frac{1}{64}$	.28	$\frac{5}{8}$	.42
$\frac{1}{128}$	.30	$\frac{3}{4}$	.43
$\frac{1}{256}$	.33	$\frac{7}{8}$	.44
$\frac{1}{512}$	.35	$\frac{15}{16}$	.45
$\frac{1}{1024}$	.37	$\frac{1}{2}$	.50

All sizes from $\frac{1}{8}$ inch upward are the same in price as the Coe's Drill, Fig. 363, page 90. We can furnish this style of drill up to $1\frac{1}{2}$ in. in diameter, but we do not recommend their use above 1 inch, as the shanks are too light to stand the strain of heavy work. All sizes of No. 112 Drills measure 6 inches over all. Shanks are $\frac{1}{2}$ inch diameter by $2\frac{1}{2}$ inches long.

There are also two other lines, known as Prentice drills, viz: No. 111 and No. 111A. No. 111 are same as No. 112, Fig. 364, but longer in the twist, measuring over all from $5\frac{1}{2}$ to $9\frac{1}{2}$ inches; the No. 111A, are furnished in sizes from $\frac{1}{8}$ to $\frac{1}{2}$ inch; shanks, $\frac{1}{2} \times 2$ inches—fit Boynton & Plummer Drill Press, No. 0. Can supply either style. Prices upon application.

Bit Point Drills, or Machine Bits, for wood (Fig. 365), as they are sometimes called, are coming into more general use. We sell them quite extensively to Chair and Carriage manufacturers; although somewhat more expensive in price than ordinary Machine Bits, they are really more economical to use, as they can be sharpened and used as long as there is any twist left, besides being stronger.

Diam.	Each.	Length.	Diam.	Each.	Length.
$\frac{1}{8}$	\$0.16	3	$\frac{1}{4}$	\$0.64	$5\frac{1}{2}$
$\frac{1}{16}$	.20	$3\frac{1}{2}$	$\frac{3}{16}$	.68	6
$\frac{1}{32}$	.24	$3\frac{3}{4}$	$\frac{1}{2}$	.76	$6\frac{1}{2}$
$\frac{1}{64}$	.28	$3\frac{1}{2}$	$\frac{5}{8}$	.80	$6\frac{1}{2}$
$\frac{1}{128}$	.32	4	$\frac{3}{4}$	.92	$6\frac{1}{2}$
$\frac{1}{256}$	.36	$4\frac{1}{2}$	$\frac{7}{8}$	1.08	7
$\frac{1}{512}$	.40	$4\frac{1}{2}$	$\frac{15}{16}$	1.32	$7\frac{1}{2}$
$\frac{1}{1024}$	.44	$4\frac{1}{2}$	$\frac{1}{2}$	1.76	
$\frac{1}{2048}$	.52	5	$\frac{3}{8}$	2.07	
$\frac{1}{4096}$	.56	$5\frac{1}{2}$	$\frac{1}{4}$	2.39	
$\frac{1}{8192}$	.60	$5\frac{1}{2}$	$\frac{1}{8}$	2.70	

With exception of the extremely large sizes, Drills can be sent by mail at very small expense.



FIG. 365. BIT POINT DRILL.



FIG. 366. BIT STOCK DRILL.



FIG. 367. RATCHET DRILL.

Bit Stock Drills, Fig. 366, fit any ordinary brace, and will drill steel, iron or other metals, as well as wood.

Diam.	Each.	Diam.	Each.	Diam.	Each.
$\frac{1}{8}$	\$0.08	$\frac{1}{4}$	\$0.27	$\frac{1}{2}$	\$0.60
$\frac{1}{16}$	.09	$\frac{3}{16}$	.32	$\frac{3}{4}$	.68
$\frac{1}{32}$	.11	$\frac{1}{2}$	.36	$\frac{1}{2}$	.75
$\frac{1}{64}$	.13	$\frac{3}{4}$	.40	$\frac{3}{4}$	.83
$\frac{1}{128}$	.16	$\frac{1}{2}$	.44	$\frac{1}{2}$	.90
$\frac{1}{256}$	.18	$\frac{3}{4}$	.48	$\frac{3}{4}$	.98
$\frac{1}{512}$	.21	$\frac{1}{2}$	.52	$\frac{1}{2}$	1.08
$\frac{1}{1024}$	.24	$\frac{3}{4}$	.55	1	1.18

Fig. 367, Drill fitting Ratchet, is suitable for nearly all standard styles of ratchets.

Diam.	Each.	Length.	Diam.	Each.	Length.
$\frac{1}{8}$	\$0.80	5	$\frac{1}{4}$	\$1.08	$6\frac{1}{2}$
$\frac{1}{16}$	.84	5	$\frac{3}{16}$	1.12	$6\frac{1}{2}$
$\frac{1}{32}$	.78	5	$\frac{1}{2}$	1.16	$6\frac{1}{2}$
$\frac{1}{64}$	.92	5	$\frac{3}{4}$	1.24	$6\frac{1}{2}$
$\frac{1}{128}$	.96	6	$\frac{1}{2}$	1.40	7
$\frac{1}{256}$	1.00	$6\frac{1}{2}$	$\frac{3}{4}$	1.64	$7\frac{1}{2}$
$\frac{1}{512}$	1.00	$6\frac{1}{2}$	$\frac{1}{2}$	1.84	8
$\frac{1}{1024}$	1.04	$6\frac{1}{2}$	1	2.04	$8\frac{1}{2}$
$\frac{1}{2048}$	1.04	$6\frac{1}{2}$	$\frac{1}{4}$	2.48	9

SPECIAL TOOL HOLDERS OR CHUCKS.

On these two pages, we represent a class of tools, the great advantages of which are difficult to describe by means of catalogue or circulars. Although tools of a similar style have been in use for some time, by a limited number of manufacturers, we believe it is only within the past year or two that they have been placed on the market regularly. There are very few manufacturing establishments in which tools of this kind cannot be used to great advantage, saving both time and money.

The main purpose of the tool is to enable one to change rapidly, Drills, Taps, Counterbores and other tools, without stopping the Spindle of the Drill Press, or any other Machine in which they are used.

Very often a tool of this kind, used in connection with an ordinary Drill Press, will effectually take the place of a three, four or six Spindle Drill Press, costing from \$175 to \$300; and in some cases, where peculiar shaped tools are used, will prove even more convenient, as the location of Spindles in a Multiple Spindle Drill sometimes interferes with their "handiness."

We are using a number of these tools in our shop, and have had a sketch made, Fig. 369, showing part of a machine, upon which we use the Holder and various Sockets to good advantage.

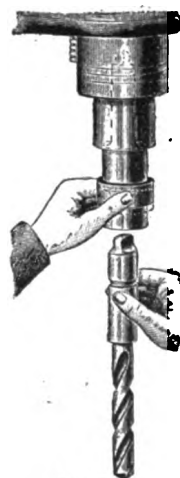
Description of sketch, Fig. 369: "A" is a 1 inch hole, 1½ inches long, Drilled, Reamed and Top Edge Faced; "B" is a ½ inch hole, 1 inch long, Drilled, Reamed and Counter-bored for fillister head screws; "C" is a ½ inch hole, ½ inch long, Drilled, Reamed and Counter-bored; "D" is a ½ inch hole, 2½ inches long, Drilled, Reamed and Counter-bored; "E" is

Drilled, Counter-bored and Tapped for screw ¼ inch diameter.

All of the above named operations are performed while the piece worked upon is held in a Fixture, or "Jig," made especially for this purpose.

The foregoing description simply applies to a single part of one machine that we are making; and we use these tools on a great many other parts of this same machine, as well as on other machines.

We will be pleased at all times to figure on special Tools and Appliances, for the economical production of manufactured articles. We have superior facilities for this class of work. Please send Drawings, Sketches or Samples of the work to be done.



The illustration Fig. 368, shows the chuck in position in the spindle of the drill press. The lifting of the ring releases the collet holding the drill, allowing it to drop out and be replaced by another, without necessitating the stopping of the spindle; the dropping of the ring locking the new collet and drill in place. The locking ring is so made that it may be held stationary while the chuck revolves in it. A complete set is composed of a chuck and nine collets; three of each of the Morse standard tapers, numbers 1, 2 and 3. The object in having three collets of each taper is

FIG. 368.

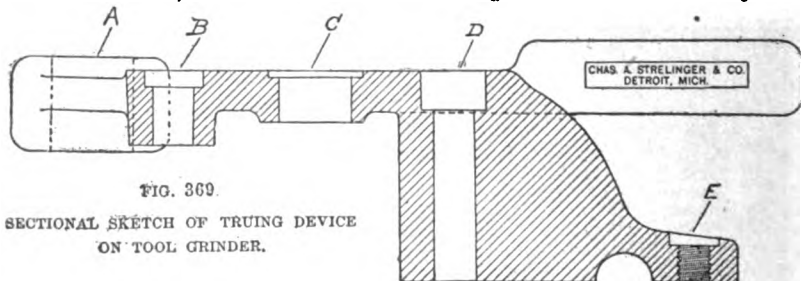


FIG. 369.

SECTIONAL SKETCH OF TRUING DEVICE
ON TOOL GRINDER.

to allow a change of drills to be made without stopping to drift the drill from the collet. The construction of the Chuck is simple, and it will not get out of order.



FIG. 370. CHUCK.

FIG. 371.
No. 1.FIG. 372.
No. 2.FIG. 373.
No. 3.

COLLETS FOR MORSE TAPER SHANK DRILLS.

Chuck with shank fitted to No. 3

or 4 Morse taper,

\$6.00

Chuck with shank unfitted,

5.00

Collets, No. 1 taper, each,

2.00

" " 2 " "

2.50

" " 3 " "

3.00

PATENT SAFETY DRILL AND TAP-HOLDER.

This tool (Fig. 374) is intended for use in the Upright Drill, Lathe, Screw Machine, or any machine with a revolving spindle. In construction the Holder is simple; there is nothing to get out of order, no complicated parts, and its operation is easily understood by the ordinary mechanic. If properly used, it is impossible to break either drill or tap, and the change from one to the other can be instantly made without stopping the machine.

The Holder consists of a body *G*, screw threaded on the outside and recessed to receive the friction socket *A*; has taper shank regularly made to the Morse taper, but can be turned to any desired taper. The friction socket *A* receives the drill socket *E*, or tap socket *D*, and is driven by the friction obtained by tightening the friction cap *B*; when adjusted, is held by the check nut *C*.

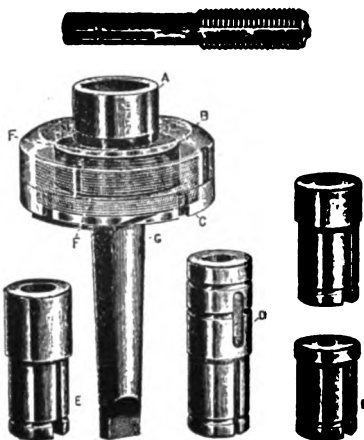


FIG. 374. SAFETY HOLDER.

The tap socket and taps being driven through feathers, prevents all danger of stripping the thread by careless hand-feeding. All holes are tapped straight, and the tap being held loosely, does not cut larger than itself.

No. 0 Holder takes drills or taps $\frac{1}{8}$ inch to $\frac{1}{4}$ inch inclusive. Price, \$37.00.

No. 1 Holder takes drills or taps $\frac{1}{8}$ inch to $\frac{1}{4}$ inch inclusive, shank turned to No. 3 Morse taper. Is furnished with one No. 1 Morse taper drill socket, two tap sockets and two spanner wrenches. Price, \$31.50.

No. 2 Holder takes drills or taps $\frac{1}{8}$ inch to $1\frac{1}{4}$ inch inclusive, shank turned to No. 4 Morse taper. Is furnished with one each No. 1, 2 and 3 Morse taper drill sockets, one tap socket and two spanner wrenches. Price, \$54.00.

PRICE-LIST OF SPECIAL TAPS USED WITH PATENT SAFETY DRILL AND TAP-HOLDER.

$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$
\$0.40	.45	.50	.55	.63	.70	.80	.95	
$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	1	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{4}$	
\$1.10	1.25	1.45	1.60	1.80	2.00	2.25		

Taps with special threads furnished to order. When ordering Taps, specify the number of holder for which they are intended.

Each article in this book is designated by either a figure number, stock number or both.

Please do not cut or deface this book.

Order goods by figure or stock number.

DRILL CHUCKS.

Drill Chucks may properly be divided into three classes.

Class One. In this are the "Little Giant," "Reid," "Oneida," "Hartford," "Little Hercules," "Pratt's Improved," "Empire," and two or three others. With exception of the "Hercules," they are of the same general style, having two jaws worked with a right and left hand screw. This is recognized as being the strongest and most durable type of Drill Chuck for general Machine Shop use.

The weak point in many of this class of Chucks has been the light screw used. We have sold hundreds of the above makes, and the "Pratt's Improved" and "Empire" are the only ones for which we have never had to replace screws. The screws in both of these are from 50 to 100 per cent stronger than in most of the others. Besides this, the Driving Plate device in the former relieves the screw from any severe strain.

Class Two. In this are the "Beach," "Stetson," "Almond," and "Victor," all standard and well known, finely and accurately made, and are especially adapted for the finer grades of work. The capacity of the largest being about one-half inch. Are not intended for (nor will they stand) as hard usage as those in Class One.

Class Three. Comprises the "Acme," "Peerless," "Pequot," "1883," "Boss," "Titus," "Trump," "Star," "Center Drill," and others. They are lower in price, and are sold and used extensively.

The Drill Chucks illustrated, described and priced in this catalogue, are selected from the foregoing, and are in our judgment the very best in their respective classes.

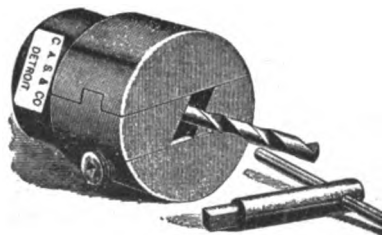


FIG. 375. EMPIRE DRILL CHUCK.

The Empire Drill Chuck, Fig. 375, is quite similar in style to the "Hartford," "Oneida" and old "Little Giant." The Screws in this Chuck are uncommonly heavy, and we consider it as being equal to—or better than—any Chuck of its class, excepting only the Pratt's Improved.

No.	Each.	Capacity.	Diameter.
6	\$ 4.00	0 to $\frac{1}{2}$ inch.	$1\frac{1}{2}$ inch.
7	4.80	0 " $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
8	5.60	0 " $\frac{3}{4}$ "	3 "
9	6.40	0 " 1 "	3 $\frac{1}{2}$ "
10	13.60	0 " $1\frac{1}{2}$ "	5 $\frac{1}{2}$ "
11	15.20	0 " 2 "	6 "

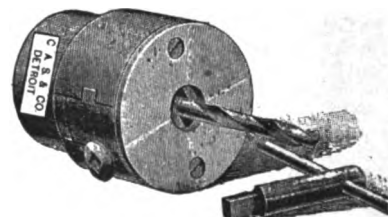


FIG. 376. "PRATT'S IMPROVED."

The distinctive feature of the Pratt Chuck is the Patented equalising driver, in which the end of the drill is inserted, giving positive rotation to the drill, independently of the jaws of the Chuck. This Driver is self adjusting, permitting the jaws to centre and align the drill accurately, so that it is always true and absolutely impossible for the drill to slip while at work.

We believe this Chuck, which has all the advantages of a common Friction Drill Chuck, together with the holding power of a taper socket, will at once recommend itself. The patented face plate is made of steel, and materially strengthens the walls of the body. The parts of the Chuck are made to standard gauges, and are practically interchangeable. The working parts are made of tool steel, carefully tempered to prevent wear, and with proper use are virtually indestructible. There is a decided saving in time in its use over the ordinary Friction Chuck, it being designed for continuous, rapid and hard service; it drives the drill to its full capacity without wear or damage to its shank.

NOTE—The jaws of the Pratt Chuck can be taken out without removing the face plate.

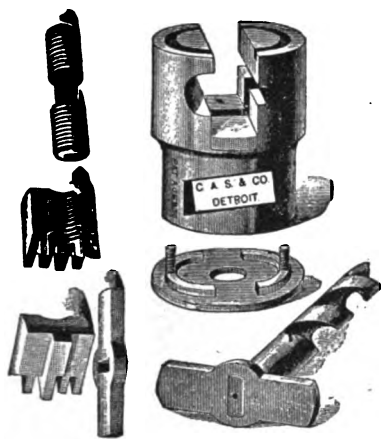


FIG. 377. "PRATT'S IMPROVED."

The above cuts show the Chuck Body, Face Plate and the Positive Driver engaging the shank of drill, also the working parts of the Chuck. The jaws and screws are carefully tempered and surface ground after tempering, thereby insuring perfect accuracy.

NOTE—It is not necessary that the end of drill should be flattened centrally; the recess in Chuck Body for driver permits the driver to adjust itself to any inaccuracy in this respect; also, it will drive equally well either right or left hand drills, reamers, taps, etc.

	Each.	Capacity.	Diameter.
No. 1.	\$ 6.40	0 to $\frac{1}{4}$ inch.	$2\frac{1}{4}$ inch.
" 2.	7.20	0 " $\frac{3}{8}$ "	3 " "
" 3.	8.00	0 " 1 " "	$3\frac{1}{2}$ " "
" 4.	14.40	0 " $1\frac{1}{2}$ " "	5 " "
" 5.	16.00	0 " 2 " "	6 " "

FIG. 378. TAPER SPLIT SLEEVES.

The above cuts show Taper Steel Sleeve. Its application to taper shank drill is obvious. It enables the user of taper shank drills and other special tools to adopt the Pratt Chuck without discarding stock of drills.

One Sleeve for No. 1 Chuck, holding taper drills, $\frac{1}{4}$ inch to $\frac{1}{2}$ inch,	\$0.35
Two Sleeves for No. 2 Chuck, holding taper drills, $\frac{1}{4}$ inch to $\frac{1}{2}$ inch,	.70
Three Sleeves for No. 3 Chuck, holding taper drills, $\frac{1}{4}$ inch to $1\frac{1}{2}$ inch,	1.15
Four Sleeves for No. 4 Chuck, holding taper drills, $\frac{1}{4}$ inch to 2 inch,	2.00

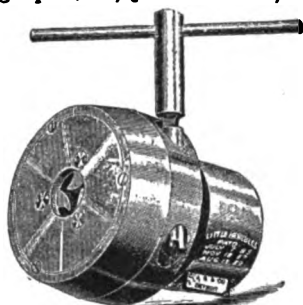


FIG. 379. LITTLE HERCULES DRILL CHUCK.

The "Little Hercules" Drill Chuck (Fig. 379), has been on the market some three or four years, and has in all cases given the best of satisfaction. It has three rotating jaws, pivoted at their ends as shown. The formation of the jaw is such that they rotate eccentrically, and the pressure of the work upon them tends to tighten the drill or tool within the jaws. The jaws are rotated by engaging an internal hardened steel ring that is driven by a side screw.

	Each.	Capacity.	Diameter.
No. 1.	\$5.60	0 to $\frac{1}{4}$ inch.	$1\frac{1}{2}$ inch.
" $1\frac{1}{2}$.	6.40	0 " $\frac{1}{2}$ "	$2\frac{1}{2}$ " "
" 2.	7.20	0 " $\frac{3}{4}$ "	$2\frac{1}{2}$ " "
" 3.	8.00	0 " $1\frac{1}{4}$ "	$3\frac{1}{2}$ " "
" 4.	9.60	0 " $1\frac{1}{2}$ "	4 " "

FIG. 380. DRILL PRESS ARBOR.

FIG. 381. BLANK ARBOR.

The cuts represent Centre Arbors for attaching Chucks to Drill Presses or Lathes.

Fig. 380 is fitted with either $\frac{1}{4}$, $\frac{3}{8}$ or $\frac{1}{2}$ inch shank for Blacksmiths' Drill Presses. Price each, \$0.65.

Fig. 381 is a blank shank $4\frac{1}{2}$ inch long by $1\frac{1}{2}$ in diameter. Price each, \$0.50.

DRILL CHUCKS (Continued).*

Notwithstanding the largely increased demand for Drill Chucks, there are a great many users of drills who have never been led to see the advantages of chucks from an economical point of view. Out of the many thousands of drill presses sold every year, not one in a hundred is supplied with a chuck. With very few exceptions, all the blacksmith drill presses sent out have half inch hole in socket to suit Prentice Drills (Fig. 364, page 91), or $\frac{3}{4}$ inch to suit Coe's Drills (Fig. 363, page 90).

At least eighty per cent. of drills used are $\frac{1}{2}$ inch and under, and the straight shank drills in the smaller sizes are very much less in price than either the Coe's or Prentice style of drill. This fact can be readily ascertained by comparing the price-lists of drills. As an example, a $\frac{1}{2}$ inch Coe's drill sells for thirty cents, while the same size straight shank drill sells for eleven cents.

If many drills are used, the saving will pay for a chuck in a short time; besides, a small drill held in a chuck is stronger than the same size drill with a larger shank. Figs. 380 and 381 show Arbors fitted for drill presses, and we can furnish any of the Drill Chucks shown with these arbors, and at moderate cost.

Another advantage of the Drill Chuck is, that Countersinks, Reamers and other tools, can be made of any round stock that is conveniently at hand and used in chuck, without going to the trouble of fitting it to an exact size.

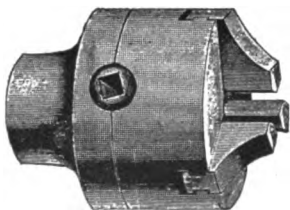


FIG. 382. KEY-DRILL CHUCK.

The Key-Drill Chuck is one of the oldest styles, and is still held in very good favor, especially throughout New England. It is a convenient three-jawed chuck; has recently been remodeled and improved throughout; has a new style socket pinion that only projects slightly

through the outside of the chuck. Jaws, after being tempered, are ground to run perfectly true. Made in but two sizes.

No. 1,	\$5.20	Holding 0 to $\frac{1}{2}$ inch.
" 2,	6.40	" $\frac{1}{2}$ to $\frac{3}{4}$ "

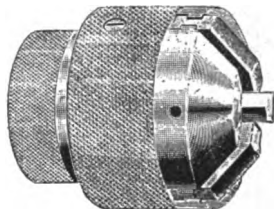


FIG. 383. ACME DRILL CHUCK.

The Acme Drill Chuck is an improved edition of the old "\$4.00" Drill Chuck. This has been on the market for nearly twenty years, and we consider it as being easily the best Drill Chuck made for the price. It is tightened by hand, requiring no spanner wrench.

Price, \$3.20	Holding 0 to $\frac{1}{2}$ inch.
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The "1883" Drill Chuck is similar in style; but larger and heavier; holds drills from $\frac{1}{2}$ to $\frac{3}{4}$ inch. Price, \$4.50.

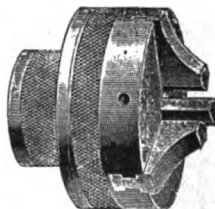


FIG. 384. PEERLESS DRILL CHUCK.

Peerless Drill Chuck is about the same as the "Acme" (Fig. 383), but in a more compact form, being a little shorter and somewhat lighter.

Is made in but one size, holding from 0 to $\frac{1}{2}$ inch. Price, \$3.20.

* We beg to state that if our customers require any other make of chuck not shown here, we can furnish same; but we would urge the fact that all chucks shown, described and priced here, are selected as being superior in all ways, and our selections are made from an experience of nearly twenty-five years, both in using and selling. We do not believe there is a chuck in the United States that we are not familiar with.

We fully warrant every chuck sent out, and will replace, free of charge, goods that are defective in any particular.

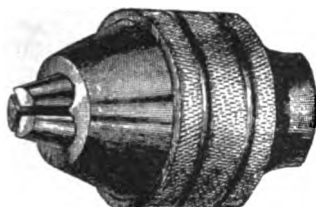


FIG. 385. ALMOND DRILL CHUCK.

This is a very popular fine, medium priced Chuck, and is used to a very large extent on Sensitive and Multiple Spindle Drill Presses. Will center and hold drills with a firm grip.

No. 0, \$4.40, holds drills from 0 to $\frac{1}{8}$ in.
 " 1, 4.40, " " " 0 to $\frac{1}{4}$ "
 " 2, 7.20, " " " 0 to $\frac{1}{2}$ "



FIG. 386. BEACH DRILL CHUCK.

The Beach and Stetson Chucks are doubtless the finest chucks made, as regards perfection of fitting and accuracy.

No. 0, \$7.20, holds drills from 0 to $\frac{1}{8}$ inch.
 " 1, 7.20, " " " 0 to $\frac{1}{4}$ "
 " 2, 7.65, " " " 0 to $\frac{1}{2}$ "
 " 3, 9.00, " " " $\frac{1}{4}$ to $\frac{1}{2}$ "
 " 4, 9.90, " " " $\frac{1}{4}$ to $\frac{3}{4}$ "

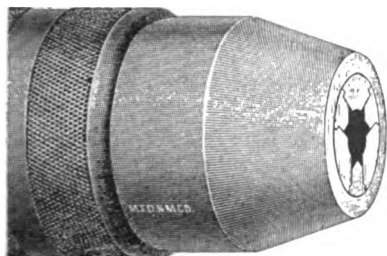


FIG. 387. STETSON DRILL CHUCK.
 Price, \$7.65.

The Stetson Chuck is made in but one size, No. 2, holding drills from 0 to $\frac{1}{2}$ inch. The threaded and working parts of chuck

are covered. Style of construction secures great firmness and accuracy.



FIG. 388. TRUMP DRILL CHUCK.

No. 1, \$1.35, holds drills from 0 to $\frac{1}{8}$ in.
 " 2, 2.25, " " " 0 to $\frac{1}{4}$ "
 " 3, 4.03, " " " 0 to $\frac{1}{2}$ "

The Trump Drill Chucks are medium priced, and are sold very extensively in No. 1 and 2 sizes for light manufacturing purposes. They excel in every particular the small two-jawed chucks, and are but little higher in price. We price the No. 3 size to present a complete line. We do not especially recommend this size as, in our judgment, it does not compare favorably with either the No. 1 Almond, Fig. 385, or Nos. 6 and 7 Empire, Fig. 375, and it costs nearly as much.



FIG. 389. CENTRE DRILL CHUCK.

Price, any size, \$2.50.

This Chuck is made of steel; has hardened jaws. Each Chuck is intended to hold *but one size drill*, and when sizes are fixed, it is perhaps the best chuck to use, especially for small drills. We can furnish them in any size, holding drills $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter.



FIG. 390. BARBER'S CHUCK.

Price, \$1.50.

The Barber Chuck is especially adapted for holding bits or drills with square shanks. The chuck part consists of two jaws and a sleeve, similar to those in the Barber's Bit-Stock or Brace. The Shank is about $\frac{1}{4}$ inch diameter, and can be turned down to fit any socket. Is useful for rough or emergency work. Cannot be depended upon for any degree of accuracy for the reason that nearly all boring bits made with square shank are apt to run out of true.

LATHE CHUCKS.

There are three styles of Lathe Chucks in general use, the Independent, in which the jaws move independent of one another or separately; the Universal, often called the "Horton" style, in which all the jaws move at once to or from the centre; and the Combination; which combines the movements and principles of both the other styles.

There are seven well-known makers of Lathe Chucks, and to the best of our knowledge all of them make good goods. We have sold at times all of the different makes, and are using in our own shops at the present time, Chucks made by six of the different makers.

Of all the Chucks we have sold or used, the "Sweetland" has given our customers as well as ourselves the best all-round service.

We can furnish any make of Lathe Chuck desired. All orders unless otherwise specified, will be filled with the Sweetland make of Chuck. We carry in stock a complete line of this make, and consider them equal in quality to any others, and warrant them in every respect. This does not refer to "Geared" and "Lever" Scroll Chucks, our stock in these being of the Cushman make.

There is very little difference in prices of the same class of Chucks made by different concerns.

LEVER SCROLL CHUCK.

Lever Scroll Chucks (Figs. 391 and 392), are similar in principle to the Geared Scroll, but do not have the Rack and Pinions. We sell them mostly in sizes from 2 to 4 inch. They are made up to 21 inches in diameter, and are sold where a cheap Universal Chuck is required.

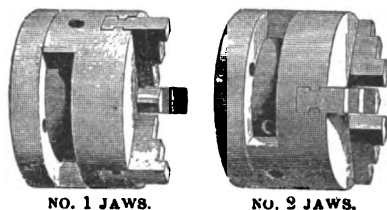


FIG. 391. HARTFORD LEVER SCROLL CHUCKS

The Hartford Lever Chuck (Fig. 391), is suitable for all kinds of machinists' work, also amateur and small Lathes; and can be used as a Drill-Chuck. It is a good Chuck, for the price, and we sell a great many of them. Are made in but three sizes. These are furnished with No. 1 or No. 2 jaws, and when two sets of jaws are ordered, we send both Nos. 1 and 2 jaws. Unless otherwise specified we always send them with No. 1 jaws.

After Chucks are sent out we cannot furnish extra jaws except by sending Chuck to factory, in order that they may be properly fitted.

Diameter.	With one set of Jaws each.	With two set of Jaws each
2 inch.	\$3.20	\$4.40
3 "	4.00	5.20
4 "	4.80	6.00



FIG. 392. AMATEUR'S LEVER CHUCK.

These Chucks are similar in operation to the Hartford Lever Chuck; are somewhat lighter and nicer made. They may be operated by hand, but a lever is furnished to use when an extra grip is required. These are furnished with No. 1 or No. 2 jaws, and when two sets of jaws are ordered, we send both Nos. 1 and 2 jaws. Unless otherwise specified we always send them with No. 1 jaws.

After Chucks are sent out we cannot furnish extra jaws except by sending Chucks to factory in order that they may be properly fitted.

Diameter.	With one set of Jaws each.	With two set of Jaws each.
3 inch.	\$4.40	\$5.40
4 "	5.20	6.40
5 "	6.00	7.20

Jewelers' Lathe Chuck. Fig. 393, is a small light Chuck for Jewelers' Lathes and small Lathes generally; is made in but one size, 2 inch in diameter, and with one style of jaws as shown in cut. Each, \$4.00

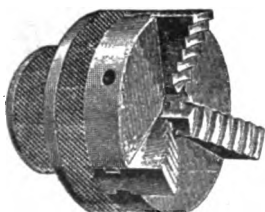


FIG. 393. JEWELERS' LATHE CHUCK.

GEARED SCROLL CHUCK.

The G geared Scroll (Figs. 394 to 396 inclusive) are universal in their action, and are used principally in sizes from 2½ to 6 inches, are most commonly used in the three-jawed form, but can be furnished with four jaws. They are made up to 15 inches in diameter, but we do not recommend them in larger than 9 inch, as they are neither as accurate nor as durable as the others.

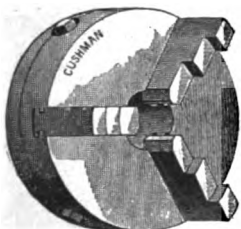


FIG. 394. NO. 1 JAWS.



FIG. 395. NO. 2 JAWS.



FIG. 396. NO. 3 JAWS.

In the smaller sizes, 3, 4 and 5 in., the G geared Scroll Chuck is the most generally used of any of the styles of universal Chucks. They are now made with three pinions, which is a decided advantage over the old style. It not only makes a handier Chuck to use, by having a pinion always within reach, but the Chuck is more perfectly balanced, an advantage when required for high speed machines. They are furnished with either Nos. 1, 2, or 3 jaws, and when two sets of Jaws are ordered, with both No. 1 and 2 jaws.

Unless otherwise specified, we always send them with No. 1 jaws.

After Chucks are sent out, we cannot furnish extra jaws except by sending Chuck to factory, in order that they may be properly fitted.

Size.	Price one Set of Jaws.	Price two Set of Jaws.	Diam. of Hole.	Face Plate
2½	\$6.00	\$7.20	½	—
3	8.00	9.60	¾	2½
4	9.60	11.50	1	3½
5	12.00	14.40	1½	3½
6	14.40	17.25	1½	4½
7½	16.00	19.80	2	4½
9	19.20	23.00	2½	5½

In Fig's 394 and 395 are illustrated the the No. 1 and 2 styles of Jaws. These styles can be furnished with the Hartford Lever, Amateur Lever and G geared Scroll Chucks.

No. 1 jaws are the style most generally used and are designed for ordinary lathe work. With this style of jaws, pieces as large as the chuck itself may be held.

No. 2 jaws are designed for drilling, holding rods and for fine work. With this style of jaws, rings, etc., can be held by the inside, while the outside is being finished.

The No. 3 jaws, Fig. 396, furnished with the G geared Scroll Chucks, are designed for use when the corners of the No. 2 jaws would be in the way. These jaws do not extend as far from the face of the chuck as the others, which is an advantage in some special work.

We will send the No. 3 style, only when the same is specially ordered.

We can furnish Chucks with special shaped jaws at an advance of merely the extra labor thereon. Send sketch, or sample piece to be held.

UNIVERSAL CHUCKS.

These Chucks (Figs. 397 to 399 inclusive) are used on Milling Machines, Brass-Working Machinery, and in shops where work is duplicated to any considerable extent; are carried in stock with both three and four jaws.

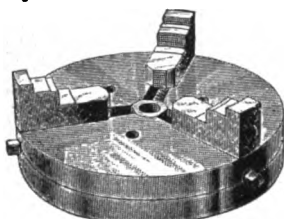


FIG. 397. THREE-JAWED UNIVERSAL, WITH NO. 0 JAWS.

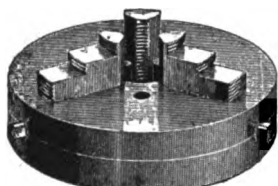


FIG. 398. THREE-JAWED UNIVERSAL, WITH NO. 1 JAWS.

This style is suitable for holding Drills, Screws, Rods, etc. Has outside bites, adapted for turning work on the outside, such as Rings, etc.



FIG. 399. THREE-JAWED UNIVERSAL, WITH NO. 2 JAWS.

Designed for use on Hollow Spindle and Milling Machines. The bite of the jaw extends below the screw, allowing the work to be grasped the full length of jaw. This chuck is used for Cutting-off Machines.

Prices of Universal Chuck are the same as Combination. See following page.

COMBINATION CHUCKS.

The Combination Chuck (Figs. 400 and 401), embracing as it does the features of both Universal and Independent types, is preferred by many to either. The principal variation in the different makes of Combination Chucks, is in the method of connecting and disconnecting the circular rack and pinions.

The Sweetland is worked by four studs on back; the Union and Skinner by one stud on back; the National by stud on side; the Cushman and Monarch by a sliding circular ring.

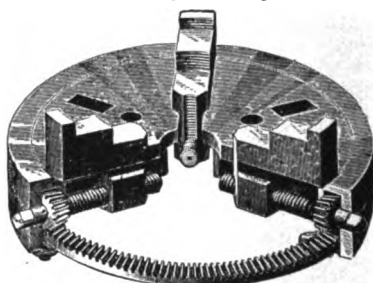


FIG. 400. FRONT SECTIONAL VIEW OF CHUCK. Showing the rack, pinion screws and jaws, also large hold through the centre, and slots through face for confining extra heavy work.



FIG. 401. BACK SECTIONAL VIEW OF CHUCK. Showing the recess in the rack, also the cam blocks which are operated to make the Chuck either universal or independent.

The above cuts show the No. 0, or common style of jaws, but of late the majority of our sales have been with the No. 4, or Reversible Jaws, illustrated in Figs. 402 and 403, on the opposite page. This jaw can be used as No. 0, 1 or 2, and hence combines these three styles in one, adapting it to every variety of work. The transverse dove-tail relieves the screws from all strain, and makes the jaw as nearly like a solid jaw as it is possible to make it.

It has the advantage of a solid nut, and will not lift from the face of the Chuck when jaw is reversed to use the out-side bites.

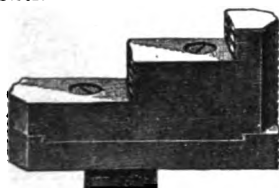


FIG. 402.

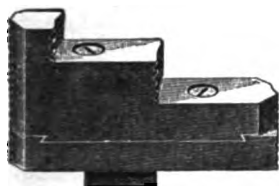


FIG. 403.

Fig. 402 represents the jaw used as No. 0 jaw. Fig. 403 represents it reversed and ready to be used as No. 1 jaw.

The change is made easily and quickly by removing the screws, reversing the top section of the jaw without moving the jaw from its place, and replacing the screws. These jaws are made from steel forgings, and are ground perfectly true on the bites after they are hardened and fitted to the Chuck.

PRICE LIST OF UNIVERSAL AND COMBINATION CHUCKS.

Size, inches.	Price, 3 jawed.	Price, 4 jawed.	Diam. over all.
4	\$14.65		5 in.
6	17.35	\$21.35	8 "
9	22.65	28.00	10 1/2 "
12	29.35	37.35	14 "
15	34.65	42.65	16 1/2 "
18	41.35	50.00	19 1/2 "
21	53.35	63.35	22 1/2 "
24	66.65	80.00	26 "
30	113.00	133.00	34 "
36	153.00	190.00	40 "

The capacity of all these Chucks is about one-half inch greater than the stated size.

[7]

TWO-JAW CHUCKS.

Two-Jaw Chucks are used principally by Brass workers, although we sell them quite often for general machine work. Style "C" is made with solid jaws grooved in the centre for holding drills, reamers and taps, and for use on screw machines, bolt cutters, etc. Are made to bolt on to a face plate

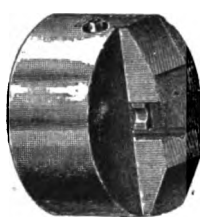


FIG. 404. Style C.

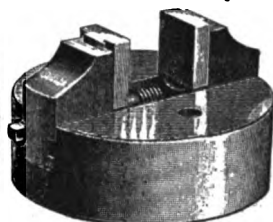


FIG. 405. Style D.

Style "D," round body with slip jaws is made to bolt on to a face plate. The 4, 6 and 7 inch, with connected jaws, have the screw at the side, giving an unobstructed hole through the Chuck.

FIG. 406. Style E.
BOX BODY.

Chuck, but the Cushman Chuck Co. make the most complete line. They are made very heavy and strong, and are first-class in every particular.

All the above Chucks are furnished with either Connected Jaws (Universal) or Independent Jaws. Unless specified, we send with Connected Jaws.

Size, inches,	4 1/2	6	7	9	12
Price, Style "C,"	\$9.60	14.40			
" " "D,"	12.80	16.00	19.20	24.00	
" " "E,"			19.20	24.00	28.80
Extra Slip Jaws, per pair, Iron,	\$0.80	0.80	0.80	1.00	90
Extra Slip Jaws, per pair, Steel,	\$1.60	1.60	1.60	2.40	3.20
Hole in Chucks,	1	1 1/2	1 1/2	1 1/2	2 in.
Face of Chuck to top of Jaw,	1 1/2	2	2	2 1/2	3 in.

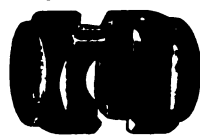


FIG. 407.

Fig. 407, shows special discs for holding Globe valves. We can furnish Box Body Chucks with any one of three styles of Discs, which can be shaped by purchaser. Illustrations, descriptions and prices sent upon application.

FOUR JAW INDEPENDENT CHUCKS.

This style of Chuck, Figs. 408 to 410, inclusive, is used for jobbing and general machine shop purposes. Is sold very extensively. It is an extremely useful Chuck, and is less in price than either the "Horton" or "Combination" style.

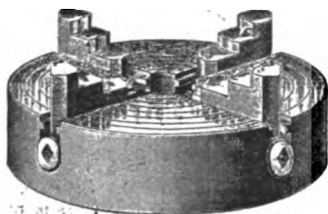


FIG. 408. CHAMPION FOUR JAW INDEPENDENT CHUCKS.

This is a comparatively new line, and these Chucks are very desirable for light Lathes. In size and appearance they are somewhat similar to the "Geared" and "Lever" Scroll Chucks, but are provided with Independent Reversible Steel Jaws, each of which is operated by a separate screw. All are provided with circular lines on the face by which to set the jaws true for holding round work. Every variety of round, square, irregular or eccentric work may be held. These Chucks will hold with great firmness, and will take pieces considerably larger than the diameter of the Chuck itself.

The cut shows the Chuck with one of its jaws reversed.

Diam.	Each.	Diam. of Hole.	Weight.
2½ in.	\$ 7.20	½ in.	1½ lbs
3 "	8.00	¾ "	2 "
4 "	9.60	1 "	4 "
5 "	11.20	1 ¼ "	5½ "

STANDARD CHUCK.

The Four Jawed Independent Chucks illustrated by Figs. 408 to 410 inclusive, are fitted with one style of jaws only. The jaws can readily be reversed by running them to the centre and turning them around. The jaws are made of steel forgings, and have a solid nut, being much stronger than jaws with half nuts, and

have a greater gripping power. The shell or body is stronger around the collar of the screw where strength is needed than any other make of Independent Chuck we know of. The pinions are extra heavy and made from steel forgings.

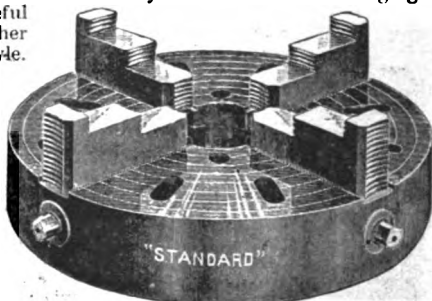


FIG. 409.

Fig. 409 represents the top view in sizes 12 to 24 inches, inclusive. They are provided with slots, as shown in cut, which will be found useful for bolting on irregular work.



FIG. 410

Fig. 410 represents the back view in sizes 12 to 24 inches, inclusive.

Diam. of Chuck.	Each.	Outside Diam.	Size of Hole.	Diam. of Recess.
4 in.	\$ 9.35	6	1	3
6 "	12.00	8	1½	3½
8 "	14.75	9½	1¾	4½
10 "	17.35	11½	2	4½
12 "	20.00	13½	3	6½
14 "	22.65	15½	3	6½
16 "	25.35	17½	3	6½
18 "	29.30	20½	4	7½
20 "	33.35	22½	4	7½
22 "	38.00	24½	4½	9½
24 "	43.30	26½	4½	9½

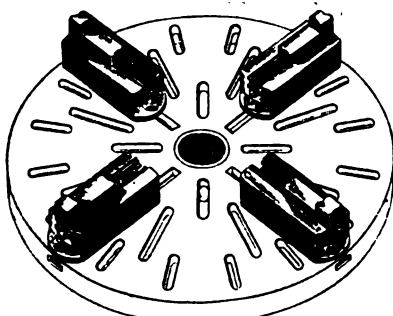


FIG. 411. FACE PLATE JAWS.

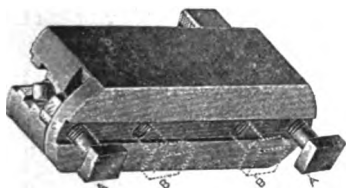


FIG. 412. BOTTOM VIEW.

Size,	8 in.	10 in.	12 in.
Set of Three,	\$33.75	\$45.00	\$67.50
Set of Four,	45.00	60.00	90.00

We furnish two bolts with each jaw and a steel key with each set.

TABLE OF DIMENSIONS.

Nominal Size,	8 in.	10 in.	12 in.
Length of Body,	8 "	10 "	12 "
" over all,	9 1/2 "	12 "	14 "
Width of Body,	3 1/4 "	4 1/4 "	5 1/4 "
Height of Body,	3 1/4 "	4 "	4 1/4 "
Length of Sliding Jaw,	5 "	6 "	7 1/4 "
Face of Body to top of Jaw	2 "	2 1/4 "	2 1/2 "
Weight, each,	23 lbs.	40 lbs.	60 lbs.

The 8-inch jaws are suitable for Face Plates from 26 to 30-inch diameter; the 10-inch jaws, for plates from 30 to 40-inch diameter; and the 12-inch jaws, for plates of 40-inches in diameter and larger.

These jaws as now made are adapted to a great variety of work and are rapidly taking the place of the very large sizes of lathe chucks.

They are handier to use, being easily attached to the machine, and may be put on and taken off the plate by one man,

without the use of tackle or hoist of any kind.

They are reversible. The sliding jaws may be quickly run out and turned end for end. The screw is reversible, and each end is squared for a wrench. The bodies may be reversed, if necessary, as they are alike at each end.

Four of these jaws bolted to the face-plate of a lathe or to the table of boring mills, drill presses, etc., make a chuck that is the cheapest, most practical and durable, and at the same time the easiest to handle of any chucks now made.

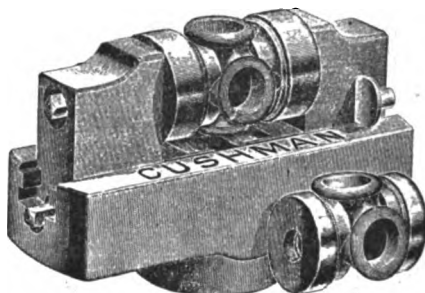


FIG. 413. VALVE CHUCK.

Fig. 413 shows a Box Body Chuck especially adapted for special work.

We can furnish these chucks for a great variety of work such as valves, faucets, fittings, bicycle parts, etc., and they give perfect satisfaction.

The price of these chucks depends on the amount of work we have to do on them, adapting them for the piece to be held. We prefer to quote a price after examining the piece and can then give full details, measurements, cost, etc.

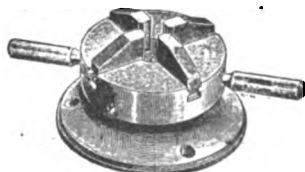


FIG. 414. BENCH CENTREING CHUCK.

Price, \$10.80.

Will Centre round, square, and oblong stock from 1/2 to 1 1/2 inches in diameter.



FIG. 415.
No. 2.
HAND-DRILL.
\$2.25.



FIG. 416. No. 12.
\$2.25.

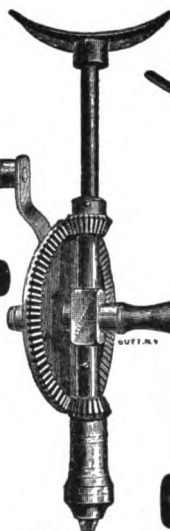


FIG. 417. No. 13.
\$3.60.

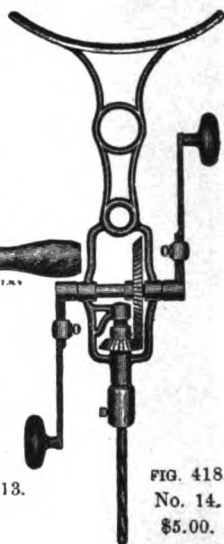


FIG. 418.
No. 14.
\$5.00.

Hand-Drill No. 2 has been recently improved, and is now provided with an adjustable friction roll to prevent the gears from slipping or springing out of engagements. The chuck holds all sizes of drills up to one-quarter inch in diameter.

Breast-Drill No. 12, Fig. 416, has a Japanned Malleable Iron Stock, Rosewood Handles and Changeable Gears; one even speed, the other three to one.

Breast-Drill No. 13, Fig. 417, is the finest breast-drill on the market, is handsomely finished, has Cut Gears, Rosewood Handles, and steel stock; drive wheel six inches in diameter, with a speed of four and a half to one.

Breast-Drill No. 14, Fig. 418, is a heavy tool, with double adjustable cranks; has heavy Cut Gears and Breast-Plate twelve inches long, curved to fit the shape of the body. The hole in spindle is one-half inch, for the use of Prentice Drills. (For sizes and prices of Prentice Drills, see page 91).



FIG. 419. No. 1 B. \$1.35.

Hand-Drill No. 1 B, Fig. 419, has Steel Spindle, Rosewood Head and Handle, and a nicely made adjustable Steel Chuck, holding twist drills from one thirty-second to one-eighth inch.

Hand-Drill No. 1, \$1.15, same as the above, but single instead of double geared. These drills are very nicely made, and we recommend them for light work.

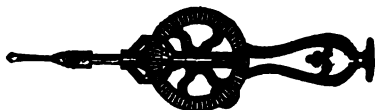


FIG. 420. No. 4 \$0.50

Hand-Drill No. 4 is designed for Scroll Sawyers, and drilling in wood; but not of much account for anything else.

UNIVERSAL CLAMP DRILLS.

A Clamp Drill is a tool that ought to be found in every well regulated Machine shop, Factory, Mill, Steam and Street Railway shops; also among Bridge builders' and Structural workers' tools, as they can be used for a greater variety of work than almost any other tool. In many places where it would be impossible to use a Ratchet Drill; also in many cases where Ratchet Drills are used, this style of Drill is very much preferred, as some classes of drilling can be done with much less labor and in one-third of the time.

It is a tool that is not in constant use, but when there is use for it, it becomes indispensable, as the name implies; they will drill at any angle. We show two styles; can furnish others if desired.

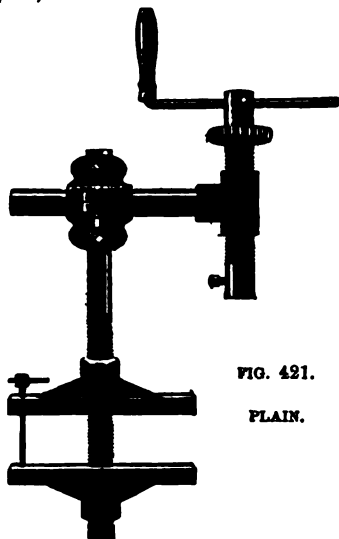


FIG. 421.

PLAIN.

The Nos. 1 and 2 are Plain, the Nos. 3 and 4 are Geared. The Posts, Spindles and Shafts are made of steel; the Clamps and Swivels of malleable iron. The Posts of Nos. 1 and 3 are $1\frac{1}{2}$ inch diameter, and the Drill Sockets take $\frac{1}{2}$ inch Straight Shank Drills, (Prentice Drills, Fig. 364, page 91).

The Posts of Nos. 2 and 4 are $1\frac{1}{2}$ inch diameter, and the Drill Sockets take $\frac{1}{2}$ inch Straight Shank Drills, (Coe's Drills, Fig. 363, page 90)

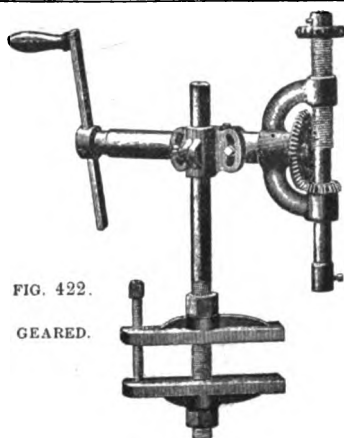
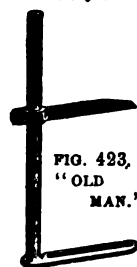


FIG. 422.

GEARED.

- No. 1, \$14.00, will drill a $\frac{1}{2}$ inch hole $2\frac{1}{2}$ deep, weight 30 lbs.
- " 2, \$19.00, will drill a 1 in. hole $2\frac{1}{2}$ deep, weight, 40 lbs.
- " 3, \$19.00, will drill a $\frac{1}{2}$ in. hole 4 in. deep, weight 40 lbs.
- " 4, \$28.50, will drill a 1 in. hole 4 in. deep, weight 50 lbs.

We can furnish any of the above Drills with plain—instead of swiveling—cross-head at \$2.00 less.

FIG. 423.
"OLD
MAN."FIG. 424.
SANDFORD
RATCHET
DRILL.

The Sandford Ratchet and Crank Drill Fig. 424., combines the continuous forward movement of the drill spindle with the single-acting movement as found in ordinary Ratchets. No. 1, \$13.00, 10 inch handle; No. 2, \$16.00, 12 inch handle.

Fig. 423. Drilling Post, is made of wrought iron, the foot is planed square and has slot for bolting down. No. 1, \$8.00, radius of arm 10 inches; No. 2, \$10.00, radius of arm 12 inches

PORTABLE OR UNIVERSAL DRILLING MACHINES.

These machines can be almost as easily placed and handled as a ratchet drill, and will drill any distance or direction from the counter-shaft, or in any position; are especially adapted to drilling pieces which are not easily moved, or which cannot be readily adjusted under other drilling machines; they are indispensable in setting-up room; saving much time and labor. Many manufacturers set their machines level on the floor and build them up by the use of these drills, not taking down their machinery, nor disturbing the level position until machine is ready to remove.

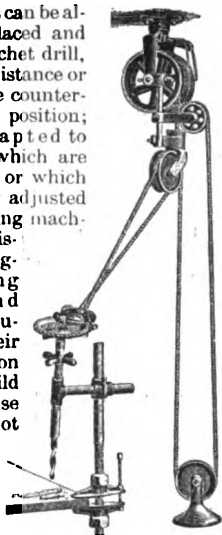


FIG. 425. NO. 3.

Their similarity to the Hand Universal Drilling Machine, found in a large majority of machine shops, enables the user to become familiar with them the first time of using. They are light, simple, compact and durable.

Fig. 425 represents Portable Drill, complete with Universal Counter-Shaft and Power Transmitter. This size is designed for light and medium work, the spindle has a feed of 4 inches, and if the holes to be drilled are parallel with the post, the feed can be increased to 12 inches or even more, by sliding the radial arm down.

Fig. 426, No. 4 Portable Drill, is geared and has three speeds. The gears are of steel, cut from the solid, and are inclosed, thereby protecting them from dirt, chips and damage.

By removing the hand wheel, and feeding with a pin (holes are provided for this purpose same as a ratchet drill), holes can be drilled to within two inches of a corner to center of drill.

Fig. 427, No. 5 Portable Drill, is for heavy work up to 1½ inches in diameter, and has three speeds. The spindle has a feed of 6 inches, and when holes are parallel

with the post, the feed can be made a foot or more by sliding the radial arm down on the post.

The feeding arrangement is Patent Differential Geared, has quick return and is entirely inclosed, taking up less room than a worm and gear, and cannot become clogged by dirt or chips.

The Patent Power Transmitter can be removed by loosening a set screw, and can be attached to the end of the spindle over the bevel gears by tightening the same set screw.

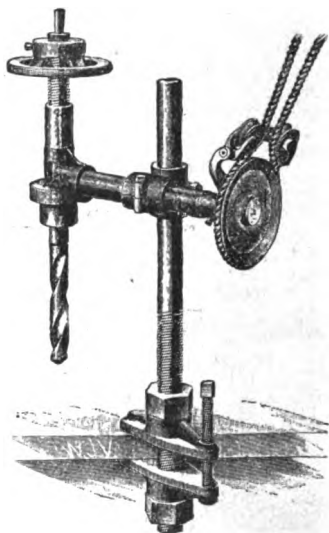


FIG. 426. NO. 4 PORTABLE DRILL.

PRICES AND DIMENSIONS.

	No. 3.	No. 4.	No. 5.
Price,	\$85.	\$120.	\$141.
Drills up to	¾ in.	1½ in.	1½ in.
Length of feed,	4 in.	5 in.	6 in.
Morse taper socket, No. 2.	No. 3.	No. 3.	No. 4.
Weight of mach.,	35 lbs.	75 lbs.	115 lbs.
Weight of counter,	90 lbs.	100 lbs.	100 lbs.
Speed of counter,	120 rev.	175 rev.	175 rev.
Diam. of pulleys,	10 in.	10 in.	10 in.
Width of belt,	2½ in.	3 in.	3 in.
Weight, boxed,	190 lbs.	225 lbs.	250 lbs.

The above prices include Counter-Shaft, 100 feet of Rope, three pairs of Couplings, all complete and ready to set up and run.

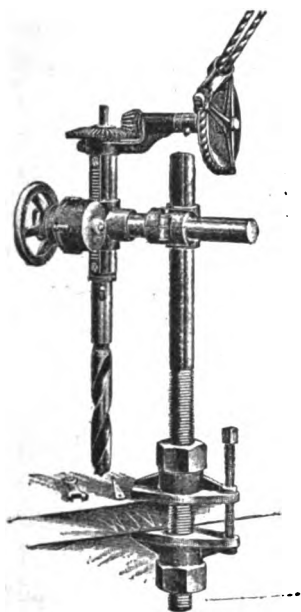


FIG. 427. No. 5. PORTABLE DRILL

MOFFAT PORTABLE DRILL

The Moffat Portable Drill (Fig. 428) is used practically for the same purposes as the Portable Drilling Machines described on preceding page, also the Stow Flexible Shaft. It fills a somewhat larger field, however, in that the area of its use is less limited. About two years ago we sold one of these drills to a customer, who manufactures large numbers of boilers and engines, and the tool has given so much satisfaction that we have recently duplicated the order.

This Drill consists of a small rotary engine, connected by two small steel gears with a drill spindle, the end of which is a taper socket. The power to run this tool can be steam or compressed air, under not less than forty to forty-five pounds pressure. Any point to which steam or compressed air can be conveyed and have the above pressure, working results can be shown equal to any drill-press. There is absolutely no loss of power, as the only medium (the two steel gears)

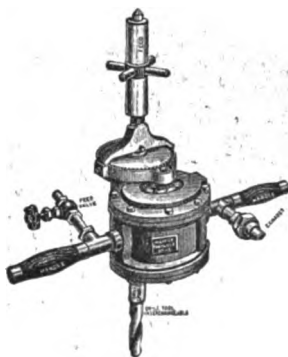


FIG. 428. MOFFAT PORTABLE DRILL

Price, \$150.00.

through which the power is transmitted, is positive. The tool is fastened to the work to be drilled in the same manner as a ratchet drill. As it weighs but forty pounds, this is easily done. It has a capacity to drill holes in steel, cast or wrought iron from five-eighths to one and three-eighths inches in diameter, and the operator, with a few days experience, will find he can drill holes one and one-half inches in diameter. The speed for the different size drills is regulated by the feed valve and feed screw, without reducing the power below a satisfactory working point. Connection between the end of the air or steam pipe and the drill is made by means of a steam hose. The length of this hose determines the area within which the drill can be operated. As the hose can be made any length, the area of work is practically unlimited, and can be carried on in the open air as well as in a shop; thus a piece of hose fifty feet long will allow drilling at any point in a circle one hundred feet in diameter. The drill can be operated in any position, horizontally or vertically, with equally good results. It is largely used for drilling, reaming and countersinking in bridge work, for drilling all kinds of iron or steel in structural work, vault work, heavy machine work, steam ship-building and repairs, drilling out rivets in boilers, tapping and screwing in stay bolts, etc.; for the latter work a pressure of from fifty-five to sixty pounds is necessary.

STOW FLEXIBLE SHAFT.

There are few of us who at some time or other have not had a personal experience with the Stow Flexible Shaft through the medium of the Dentist's Engine. The larger sized shafts as shown and described here have been manufactured for the past twenty years, and thousands of them are in use in the principal Railroad,

Machine, Boiler and Engine Shops, for Drilling, Reaming, Tapping and Wood-Boring; grinding and polishing heavy machinery, etc.

Fig. 430, is a complete shaft with sectional views; Fig 2, Construction of Core; Fig. 4, Head Piece; Fig. 8, Hand Piece; A A, Leather and Wire Case; B, Core; C, Cord for tightening belt; D, Driving Belt. Core B must be kept well lubricated with lard oil, tallow, or other animal oil; never use mineral oil.

Fig. 429 represents full Portable Drill Plant, consisting of Flexible Shaft, Counter Shaft, Drill Press, Roundabout, etc.

The makers have increased the size of Roundabout or Idler pulleys, also the driving wheel on the flexible shaft, which will permit of a $\frac{1}{2}$ inch rope, doing more work with less tension than a one inch rope would do with the old style small pulleys; thus saving the wear on belt.

For long distances, we furnish an extra idler at an additional cost of \$10. For prices of full drilling plant (less drill support), see opposite page.

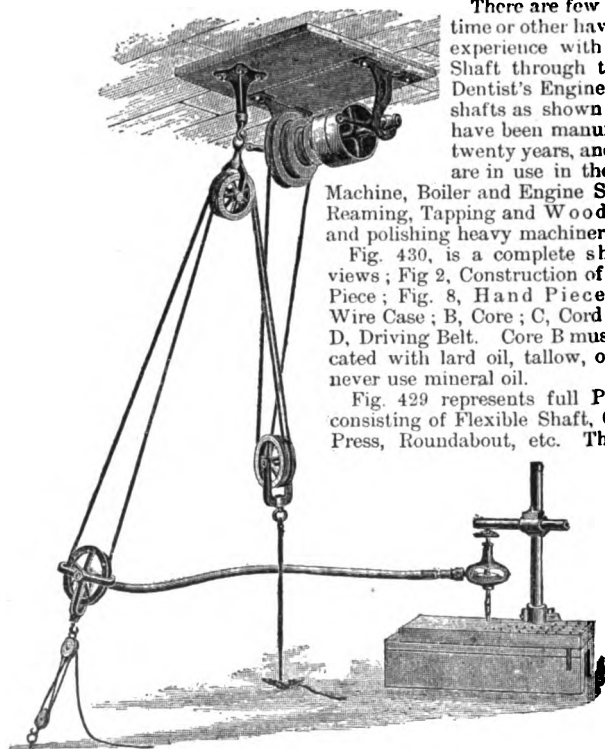


FIG. 429.

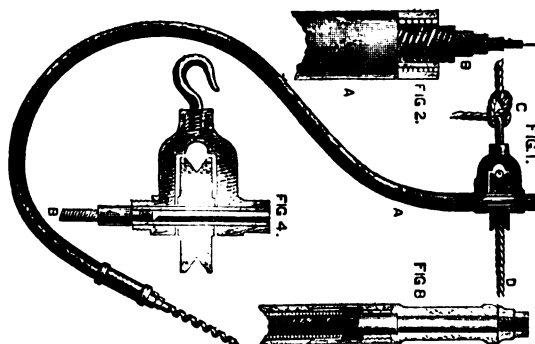


FIG. 430

No.	Price.	Diam. Core.	Length ft.	Wt. lbs.
0	\$16.00	$\frac{1}{2}$ in.	3	3
1	18.00	$\frac{1}{2}$ in.	3 $\frac{1}{2}$	5
2	25.00	$\frac{1}{2}$ in.	4	7
3	30.00	$\frac{1}{2}$ in.	5	10
4	40.00	$\frac{1}{2}$ in.	6	18
5	50.00	$\frac{1}{2}$ in.	7	30
6	60.00	1 in.	8	35
8	80.00	1 $\frac{1}{2}$ in.	8	60
9	100.00	1 $\frac{1}{2}$ in.	8	80

We can furnish these shafts in longer lengths when required.

NOTE.—The prices above are for Shaft only, as shown in Fig. 430.

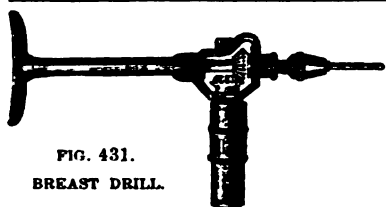


FIG. 431.

BREAST DRILL.

Drills up to $\frac{1}{2}$ inch, has malleable iron frame with steel spindles and thrust bearing, has cut gears which are covered, and a clutch arrangement to throw it in and out of gear as desired.

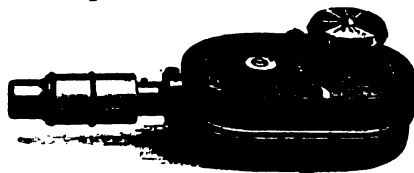


FIG. 432. PEDESTAL DRILL.

The Pedestal Drill is used only for heavy work in connection with the No. 8 or No. 9 shafts.

The Screw Feed Drill Presses, Fig 433, are furnished in 5 sizes, and used on shafts Nos. 4 to 9; are numbered to correspond with shafts with which they are used; have cut gears, and hardened stopping and starting clutch which may be thrown in or out of gear at will. Nos. 4 and 5, have Morse Taper Socket No. 1;

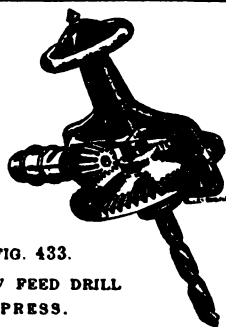


FIG. 433.

SCREW FEED DRILL PRESS.

No. 6, Morse Sockets Nos. 2 and 3; Nos. 8 and 9, Morse Sockets Nos. 3 and 4.

TAPPING AND REAMING MACHINE.

These machines (not illustrated) were designed for tapping and reaming stay bolt holes in Rollers, and reaming in Bridge work. They are used with Nos. 6, 8 and 9 shafts; are very powerful and durable; $\frac{1}{4}$ inch square hole in spindle.

No. 1, \$25.00, Geared $5\frac{1}{2}$ to 1
 " 2, 30.00, " $5\frac{1}{2}$ " 1
 " 3, 35.00, " 10 " 1

Speed of counters, given below, are only approximated and should be governed according to material drilled. When desired, we can furnish braided cotton rope in place of rawhide belt, at a slight reduction in cost, but we do not recommend it.

	Flexible Shaft.	Drill Presses.	Pedestal Drill.	Breast Drill	Roundabout	Counter Shaft.	100 ft. Rawhide Belt.	Three Pair Couplings.	Price, Complete.	Drills about up to	Speed of Counter about
No. 3,	\$30.00			\$12.00	\$10.00	\$10.00	\$20.00	\$0.75	\$82.75	$\frac{1}{2}$ in.	200
" 4,	40.00			14.00	10.00	10.00	25.00	.75	99.75	"	650
" 4,	40.00	\$20.00			10.00	10.00	25.00	.75	105.75	"	450
" 5,	50.00	25.00			20.00	20.00	30.00	1.00	148.00	$1\frac{1}{4}$ "	450
" 6,	60.00	25.00			20.00	20.00	30.00	1.50	156.50	$1\frac{1}{2}$ "	440
" 8,	80.00	30.00			20.00	20.00	38.00	2.25	190.25	$1\frac{3}{4}$ "	425
" 9,	100.00	30.00			20.00	22.00	38.00	2.25	212.25	2 "	400
" 8,	80.00		\$55.00		20.00	20.00	38.00	2.25	215.25	$2\frac{1}{2}$ "	425
" 9,	100.00		55.00		20.00	22.00	38.00	2.25	237.25	3 "	375

NO NAME FOLKS.—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name to the letter. If it is an order from him with money enclosed, we are pretty sure to hear from him later, wanting

to know where the goods are; and sometimes the letters are not overly civil. If it is a letter of inquiry and our correspondent gets no answer, he thinks we are inattentive or careless, and as a result we are apt to lose what might be a good customer.

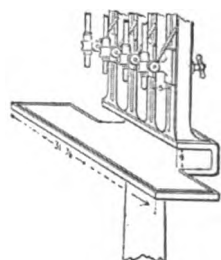
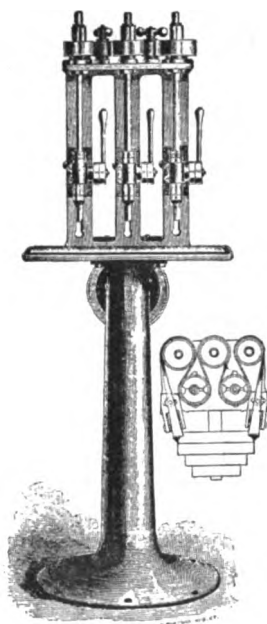
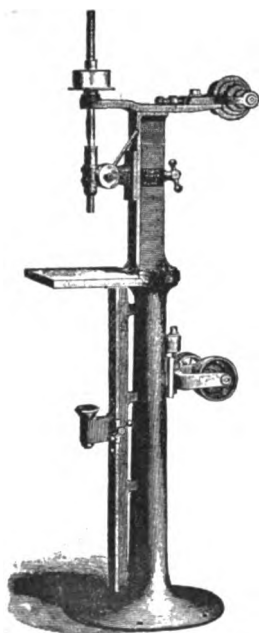


FIG. 436. EXTRA SWING.

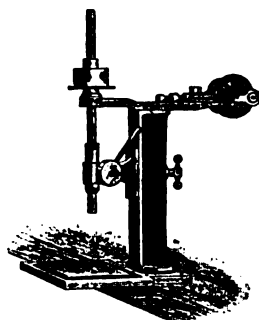


FIG. 434. 10 in., 1 Spindle. FIG. 435. 10 in., 3 Spindles. FIG. 437. 10 in., Bench.

SENSITIVE DRILLS.

For light, rapid and accurate drilling, the style known as "Sensitive" Drills, has come into very general use. The name "Sensitive" was originated and copyrighted by Dwight Slate, but there are six or eight manufacturers of this type of drill press, who use this name in connection with their machines. The name seems so aptly fitted that it is hard for the other fellows to supply a new one. Mr. Slate scolds at them and threatens, but they all go ahead and use it just the same.

The "Sensitive" features are attained, first, by nicety of fit in working parts; and secondly, by the Spindle being counter-balanced. This enables the user to feel the action of the drill, reamer, or counter-bore being used, and favor it, if the material being worked upon is hard, or of any unusual texture.

Where a large quantity of light drilling is done, the difference in breaking of drills will pay a very handsome interest on the cost of the machine.

The original tool of the style shown in Fig. 434, was brought out by Dwight Slate, of Hartford, Conn. It was then designed to drill holes $\frac{1}{4}$ inch and under. There was a splendid field for such a tool and it immediately met with great favor and a large sale. It was found so handy that it was put to quite general use, and called on to do heavier work than at first intended, so it was found necessary to make it heavier in parts from time to time. The manufacturer recommends it for work from $\frac{1}{4}$ inch down. In our judgment, however, it is not advisable to use it continuously on work any heavier than $\frac{1}{4}$ inch.

With the exception of Steel Rack in Spindle, it possesses about all the good points of the 13 inch Drill Press illustrated on opposite page.

One Spindle,	\$ 59.50	10 inch Swing.
Two "	97.00	10 " "
Three "	130.00	10 " "
Four "	162.00	10 " "

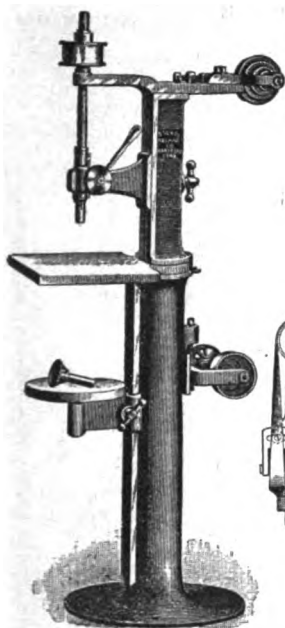


FIG. 438.

13 inch, 1 Spindle.

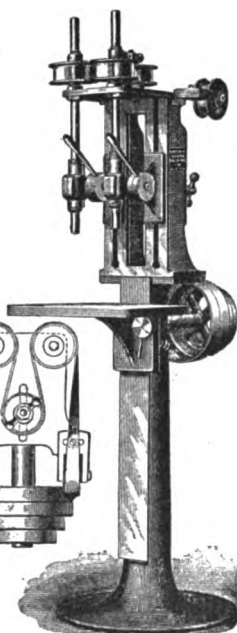


FIG. 439.

13 inch, 2 Spindles.

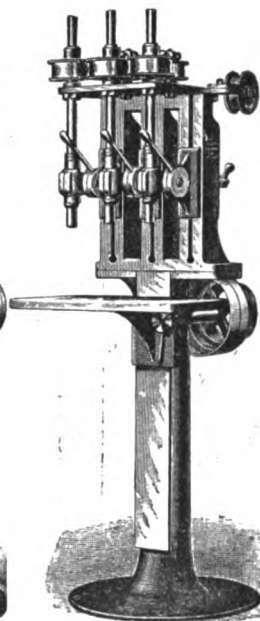


FIG. 440.

13 inch, 3 Spindles.

Fig. 437 represents the 10 inch Drill made for use on bench. It is furnished with countershaft complete, and is also made in the style of 13 inch on this page.

Price, \$46.00 10-in. swing, with counter.
 " 51.00 13 " " "

Fig. 436 represents Special Post and Table used for mounting these Drills so as to permit extra swing. We can furnish them in the different styles to drill to the centre of 19, 22 and 24 inches. Will send descriptions and prices upon application.

The 13 inch Slate Sensitive Drills (Figs. 438 to 440) are quite similar to the 10 inch, but heavier and more substantial, and are adapted to drilling holes from 0 to $\frac{1}{2}$ inch, and on lower table, work can be drilled to the centre of an 11 inch circle. Extreme height from bottom of Spindle to top of upper Table is 13 inches; to lower table at its lowest point, 44 inches.

The upper table swings out of the way when necessary. The adjustable Top Arm and Lower Yoke provide tension for the driving belt and the back belt.

In the Two, Three and Four Spindle Drills, the sizes of Tables are suitable for the capacity of Drills. The Tables have vertical movement whole length.

The Spindles in the full line of 13 inch swing Drills are alike; made of tool steel 24 inches long and $\frac{1}{2}$ inch diameter in the sleeve bearing. The Sleeve Bearing is 4 $\frac{1}{2}$ inches long. Lower end of Spindle is fitted to No. 1 Morse Taper. The Driving Pulley runs on a stud attached to top frame, and drives the Spindle by a bushing and feather in upper part of hub.

One Spindle,	\$68.00	13 inch Swing.
Two "	108.00	" "
Three "	144.00	" "
Four "	180.00	" "

The price of two, three and four Spindle Drills includes Countershaft.

NORTON DRILLS.

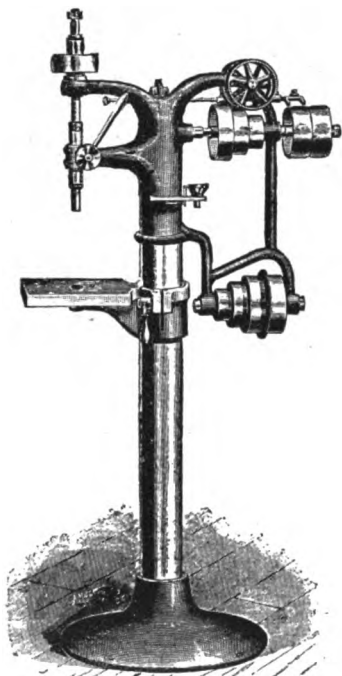


FIG. 441.

The Norton Drills, although somewhat different in style and appearance, are of the same general type as the others. Although their nominal capacity is about the same as the 13 inch Slate Drill, we think they are suited to heavier work. We have used one constantly for nearly four years, and know it to be a very desirable tool.

One Spindle Drill.	\$65.00
Two " "	102.00
Three " "	140.00
Four " "	180.00
Six " "	

They are adapted for drilling holes 0 to $\frac{1}{4}$ inch to centre of 12 inch circle. Will drill $3\frac{1}{2}$ inches in depth without readjustment of table, and will admit work from 0 to 38 inches. They have quite a few original features which make them very convenient tools, among them a Balanced

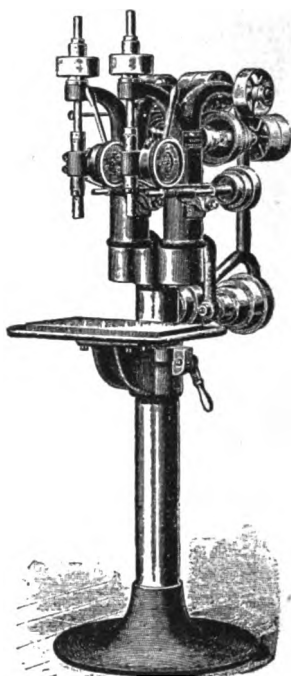


FIG. 442.

Table, which can be swung freely around the column or adjusted vertically at any point. Every manipulation can be accomplished from the front of the machine. They are handy, accurately built, powerful and substantial tools.

Fig. 442 shows the Norton Drill with Automatic Feed and Stop; can be set to drill any given depth from 0 to 3 inches, and stop automatically; spindle will fly back to position. Has also Hand Lever or Sensitive Feed, Balanced Table, Balanced Spindles, three changes of speed to each Spindle, and two changes of feed. Will drill from 0 to $\frac{1}{4}$ inch holes, $6\frac{1}{2}$ inches from column to centre of Spindle, and will receive work from 0 to 30 inches in height.

One Spindle Drill,	\$80.00
Two " "	132.00
Three " "	185.00
Four " "	240.00
Six " "	

The Oliver Drill is for doing rapid work with small drills, from 0 to $\frac{1}{4}$.

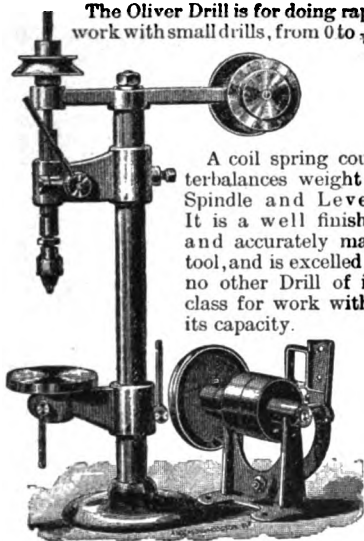


FIG. 443. OLIVER DRILL.

A coil spring counterbalances weight of Spindle and Lever. It is a well finished and accurately made tool, and is excelled by no other Drill of its class for work within its capacity.

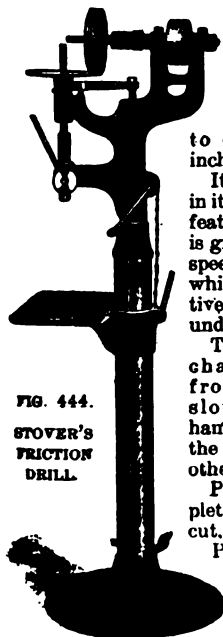


FIG. 444.
STOVER'S
FRICTION
DRILL.

The Stover Friction Drill, Fig. 444, is used for drilling from 0 to $\frac{1}{4}$ inch and to centre of a 10 inch circle.

It is very sensitive in its action, and one feature is, that power is greatest with slow speed and large drills, while it is most sensitive with small drills under high speed.

The speed can be changed instantly from the fastest to slowest with one hand, while holding the work with the other.

Price of Drill complete as shown in cut, \$45.00.

Price of same, arranged for either bench or post, \$38.00.

Fig. 443, Improved Oliver Drill. Price complete with countershaft, \$24.00; without countershaft, \$20.00.

Suitable chucks for the Oliver Drill are the small size Almond, No. 8 Empire, or the Trump Drill Chucks.

There are many different styles of small Drill Presses, and we have on hand three or four styles less in price than the Oliver, but as none of them approach it for quality, and the difference in price is not great, we refrain from cataloguing them.

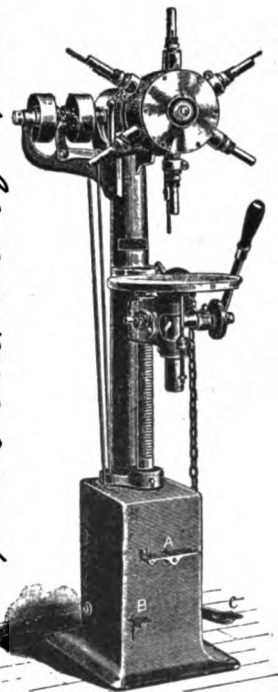


FIG. 445. QUINT'S TURRET DRILL.

The Quint's Six Spindle Turret Drill, Fig. 445, while a comparatively new tool, is sold quite extensively to the better class of manufacturers; is used for light tapping, as well as drilling. Its capacity for drilling is from 0 to $\frac{1}{4}$, and to the centre of a 20 inch circle. We lack space for an extended description, but will send complete descriptive circular upon application

we have a new style 3-4 and 6 spindle drill. Write for prices

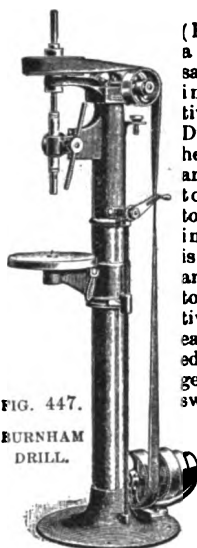


Fig. 446 represents a 16 inch Lever Post-Drill, intended for use in machine shops, where a high-priced tool is unnecessary, it being a well made and very useful tool. It will drill a $\frac{1}{2}$ inch hole 5 inches deep, and to the centre of a 16 inch circle. The table is $11\frac{1}{4}$ inches diameter, with a vertical traverse of 17 inches, the extreme distance from table to spindle being 23 inches. Price, \$40.00.

A complete Counter-shaft is included in the price of drill.

Diameter of tight and loose Pulleys, 7 inches, with $2\frac{1}{2}$ inch face. Diameter of Cone, $3\frac{1}{2}$, 5 and $7\frac{1}{2}$ inches, $1\frac{1}{4}$ inch face.

Total length, 67 inches; weight, 225 pounds.



The Burnham Drill (Fig. 447) belongs, in a general way, in the same class as the 13 inch Slate's "Sensitive" and the Norton Drills. Is built much heavier and stronger, and will drill from 0 to $\frac{1}{2}$, $5\frac{1}{2}$ inches deep to the centre of a 13 inch circle. Spindle is counter-balanced, and can be adjusted to any degree of sensitiveness. The table is easily raised or lowered by means of mitre gears and screw, and swings either way.

Weight, 350 lbs.

Price, complete with the Counter-shaft, \$65.00.

2 Spindles, \$105
3 " 130

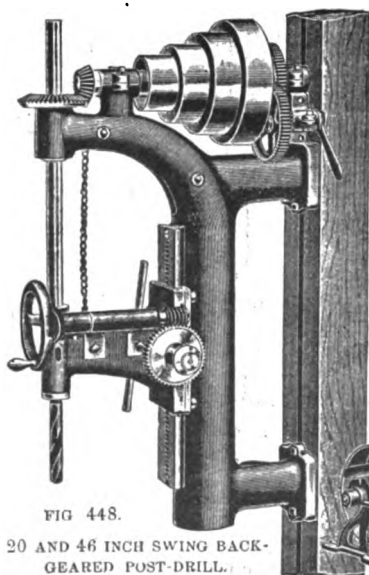


FIG. 448.

20 AND 46 INCH SWING BACK-GEARED POST-DRILL.

The Back-Geared Post-Drill (Fig. 448) was especially designed for Carriage-makers and Blacksmiths, but has proved so useful, both for general and special work, that the greater part of our sales are to machine shops. It can be bolted to wall or post at any required distance from the floor, on account of which a large range of work can be done. From face of column to centre of spindle is 10 inches, from the post to centre of spindle 23 inches, thus permitting it to drill to the centre of a circle 46 inches in diameter.

We saw one of these in use in a shop in Worcester, Mass., the swing of which was increased to 66 inches, by the use of a couple of brackets 10 inches high.

It has sliding head, quick return, lever or wheel feed (as may be preferred), and is back geared. The sliding head has a vertical movement of 18 inches, and can be instantly placed in any position by means of a quick return lever.

Diameter of spindle is $1\frac{1}{4}$ inches, with No. 3 Morse Taper Socket.

suitable for twist drills, up to $1\frac{1}{4}$ inches in diameter. Weight about 450 pounds. It is a thoroughly well made tool. Price, complete with Counter-shaft, \$75.00.

J. E. SNYDER'S STANDARD UPRIGHT DRILLS.

The Snyder Standard Drills are in every respect strictly high grade tools. As regards workmanship, they will compare favorably with any in the market.

J. E. Snyder makes a specialty of Upright Drills, manufacturing practically nothing else. For accuracy of finish, strength, capacity, durability and convenience in operating, these Drills have no superior. The Sliding Head is an especial feature; these heads are very long, have a bearing their entire length, and are firmly gibbed to the column. Every

Drill is tested by actual work before leaving the factory, and is known to be in perfect running order.

They are in use in upwards of two hundred first-class shops all over the country. The Edison Machine Works, of Schenectady, have during the past six years, bought from time to time, as their needs demanded, sixty-five of this make.

Below we give in connection with illustration, a description of the 28-inch Drill. This description applies, in a general way, to the entire line. They are made in 21, 25, 28, 30 and 36-inch swing. We will be pleased to send complete description of any size, with prices, upon application.

Fig. 449 represents Standard 28-inch Upright Drill. This machine is furnished with back gears, automatic power feed, and a quick return, which all mechanics say is a great labor-saving feature. The Spindle has a vertical automatic feed—an important point, especially when boring long holes.

By the use of the Quick Return lever in front, in connection with rack and pinion gear, the head can quickly be placed at any required position on the face of the column without the use of a wrench or disconnecting any gears. This is a most advantageous feature, especially when doing work which requires the head or spindle to be moved a long distance quickly. The head being 16 inches long, and firmly gibbed to the column, there is very little spring to the spindle when doing heavy work. The spindle is made of crucible steel and the bearing of same is 2 inches diameter. Hole in spindle conforms to Morse taper, No. 4. The head and spindle are both balanced by one

weight, and both traverse together a distance of 25 inches on the face of column. The back gears can be connected or disconnected instantly by means of a lever descending parallel with the column. The table and arm are raised or lowered by means of a crank in connection with worm and worm gear, and the table cannot fall when doing heavy work. As will be seen, the column is strongly braced so as to resist all strain.

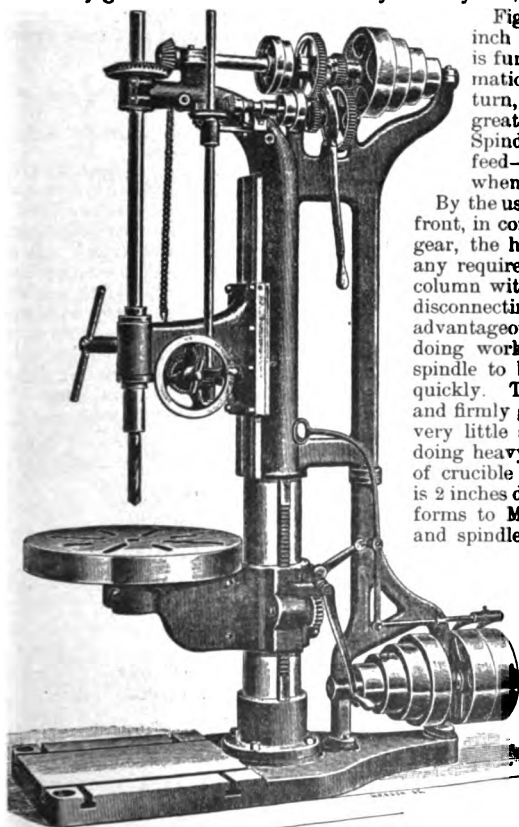


FIG. 449. SNYDER'S 28-INCH DRILL.

Weight, 2000 lbs. A friction countershaft can be furnished, for tapping purposes.

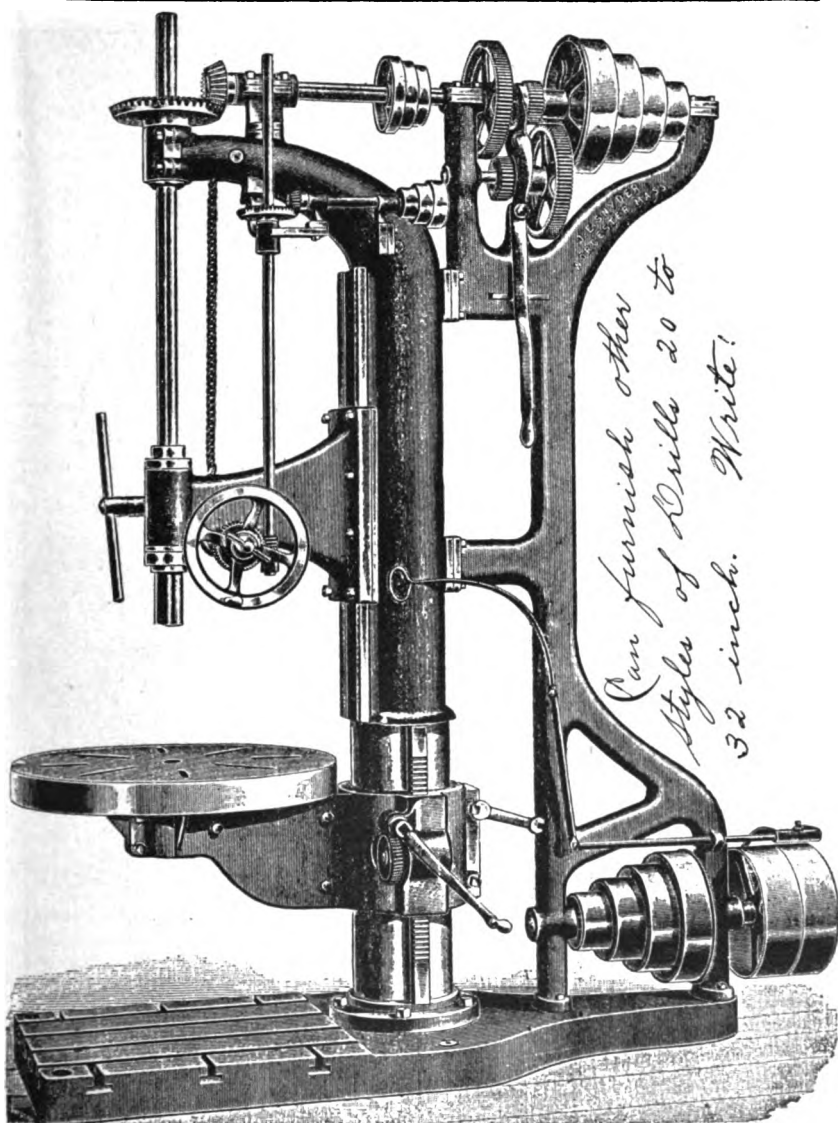


FIG. 451. SNYDER'S 36-INCH STANDARD UPRIGHT DRILL.*

*See Article on page 115. Prices on all sizes furnished upon application.
[8]

RADIAL DRILL.

On this page we represent a Patent Combination Radial and Upright Drill. It is quite simple in its construction, and also strong and effective.

These machines will drill or bore a number of holes, parallel with each other, anywhere within the range of the arm. The Spindle is geared with unusual power; has quick return, and is counter-balanced with a new device direct from the Spindle.

The column which carries the arm is turned to fit inside of stump, which, in turn, is bolted to base plate and receives the arm that supports the table, allowing table arm to revolve clear around independent of upper column.

We furnish a square table with horizontal and vertical face, with planed "T" slots, if preferred to Table and Arm as shown in cut. The upper column is securely clamped to stationary stump by a new device, which requires but one movement.

The Spindle, Feed Screw and Elevating Screw are made of machinery steel. All thrust bearings are provided with phosphor bronze washers. The machine is provided with a very heavy back-gear, power feed, and a quick return to spindle.

The countershaft has T. & L. pulleys; diameter, 14 inches; face, 3 inches. Every Machine is tested before leaving the shops.

TABLE OF DIMENSIONS.

Price,	\$	\$	\$
	Inch's.	Inch's.	Inch's.
Size of Drill,	36	60	84
Diameter of Column,	9	11	14
Height " "	70	84	90
Vertical Adjustment of			
Column Arms,	24	30	36
Height, table from base,	18	30	30
Size of Table,	22	28	30
Receives under Spindle,	48	60	66
Diameter of " "	1 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$
Traverse " "	9	12	14

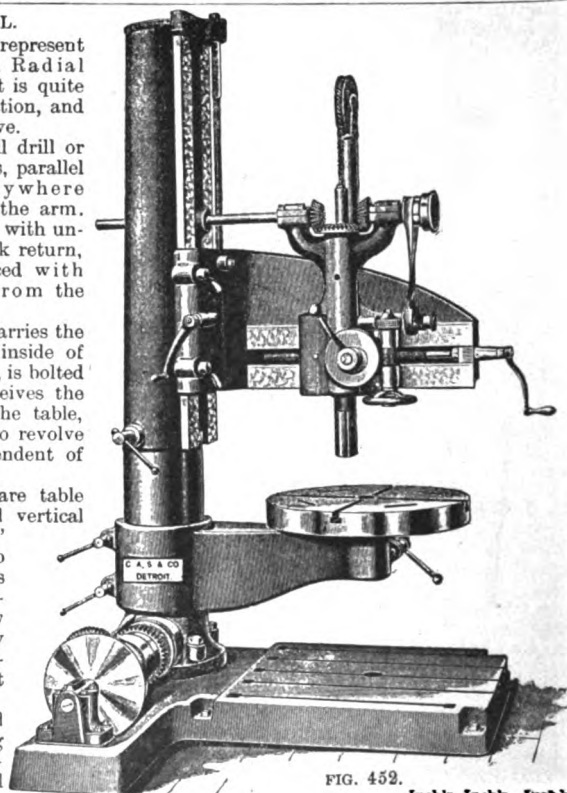


FIG. 452.

Inch's. Inch's. Inch's.

Diameter of Tight and

Loose Pulleys,	12	12	16
Width of Belt for Cone,	3	3	3
Drills to centre of circle	24	60	84.
Spindle bored to fit			

Morse Taper, Nos. 3. 4. 4 & 5

Approximate Weight, of 36 inch, 2,500 lbs; 60 inch, 3,500 lbs; 84 inch, 4,000 lbs.

SUBSTITUTION—We very seldom substitute other articles for those called for, and, when we do this, we usually put in something better or more expensive at the same prices as the articles ordered, but we wish it distinctly understood, that when we send other goods than those called for, we do it *at our own risk*, and we will pay all expense of changing, if the goods thus substituted are not satisfactory.

THE BURNHAM BLACKSMITHS' DRILLS.

The Drills shown on this and the succeeding pages, are all classed under the head of "Blacksmiths'" drills, to distinguish them, we presume, from what are known as "Machinists'" drills. They are used, however, by all classes of workmen.

There are several manufacturers of high grade Blacksmiths' Drills; among them are the Pratt & Whitney Co., Geo. Burnham Co., Boynton & Plummer, Wells Bros., and Wiley & Russell.

The Geo. Burnham Co. make the largest and most complete line, and for excellence of workmanship, their goods compare favorably with any of the above mentioned makers; a feature of great advantage being the attachment for grinding drills: See Figs. 456 and 460.

We are compelled to look elsewhere for extra small and extra large Drill Presses, Figs. 462 and 463; and also for the cheaper line of Drill Presses, shown in Fig. 464.

Some few years since, the Champion Forge & Blower Co. placed upon the market the drill press shown in Fig. 464, and gave it the idiotic name of '\$10' Drill Press. Since then a half-dozen other makers have felt called upon to name their drills after the original. In most cases, the name has no connection with the price, as the so-called "\$10" Drill Presses are sold at prices ranging from \$10.00 down to \$7.00.

Fig. 453 represents a drill made by the Burnham Co. and is, we believe, the best in this class.

This machine is designed for medium drilling—say up to 1 inch; is double geared; will drill to centre of 14 inch circle. Greatest distance from spindle to table is 10 inches. Has swing table 10 inches diameter, and automatic feed. Price, complete, \$9.50.



FIG. 453.

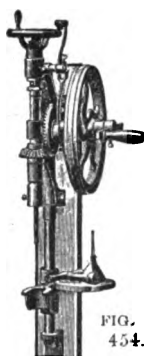


FIG. 454.

Fig. 455, No. 1, is a medium sized drill, and the one we sell most of. It is double geared, and will drill all size holes up to 1½ inches to the centre of 12 inch circle. Greatest distance from spindle to table, 12 inches; in other particulars it corresponds with the No. 1, described above.

Price, \$19.20.

Price, with tight and loose pulleys, \$22.20.

Price, with counter-shaft, \$29.40.

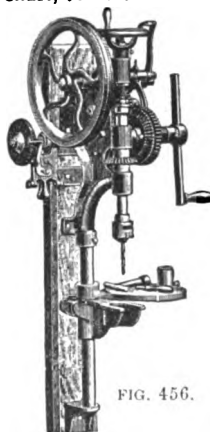


FIG. 456.

Fig. 454, No. 1, is a Single Geared Drill, heavier and stronger than the one described above. Drills to the centre of 11 inch circle. Greatest distance from spindle to table is 12 inches. Drill socket screwed on to the spindle, and takes the Prentice drill with ¼ inch round shank. Has automatic feed, which can be adjusted to four rates of speed. Has swinging table, 8 inches in diameter. Price, \$15.00.

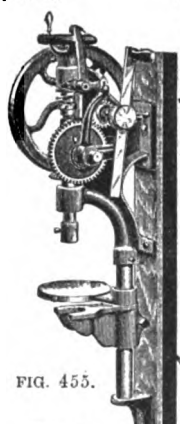


FIG. 455.

Fig. 456, No. 2, is designed for general Blacksmiths' work; it is triple geared, and will drill all size holes up to 1½ inch to the centre of 11 inch circle. Distance from spindle to table, 20 inches. Can change crank to balance wheel shaft, giving more power for heavy work. Balance wheel shaft can be disconnected by slipping intermediate gear.

Price, \$21.00.

See Drill-Grinding attachment Fig. 460.

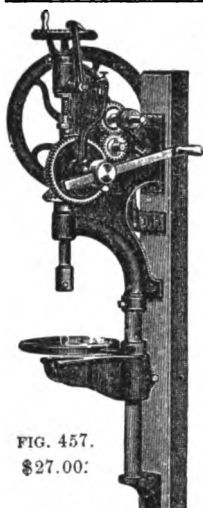


FIG. 457.
\$27.00:

Fig. 457, No. 3, is designed for Carriage-makers and heavier Blacksmith work. In general design it resembles the No. 2, but is built heavier and has larger capacity. Will drill holes up to $1\frac{1}{4}$ inches, and to the centre of 16 inch circle. Distance from spindle to table, 22 in. The drill socket screws on to spindle, and takes the Coe's drill. The crank has forward motion on both shafts.

No. 6 Drill, Fig. 459, is same style arranged for power.

Fig. 458 represents the No. 2 Drill arranged for lever feed. We can also furnish the Nos. 1 and $1\frac{1}{2}$ fitted up the same way.

This drill is especially adapted for use in ornamental and architectural iron work, as well as in many other trades where countersinking or drilling holes to a uniform depth is required. By means of a stop collar fitted on the spindle, an equal depth in every hole is certain.

The spindle is held up from the work by a counter weight or spring, not shown in cut. This device is more especially adapted to drills that are arranged for power. These drills correspond in other respects with the Nos. 1, $1\frac{1}{2}$ and 2.



FIG. 458.

\$17.00	No. 1, Hand Power.	FIG. 458.
21.50	" 1 $\frac{1}{2}$, " "	
23.50	" 2, " "	
30.00	" 1, Tight and Loose Pulleys.	
27.00	" 1 $\frac{1}{2}$, " " " "	
29.00	" 2, " " " "	
28.00	" 1, with Countershaft.	
33.00	" 1 $\frac{1}{2}$, " " " "	
35.00	" 2, " " " "	



FIG. 459.

Fig. 459, Nos. 5 and 6, represent the Nos. 2 and 3 Burnham drills ready for power. The balance wheel shaft is lengthened and has a three-step cone pulley for $1\frac{1}{4}$ inch belt. Countershaft has tight and loose pulleys 7 inches diameter for $2\frac{1}{4}$ inch belt.

Price, No. 5, \$31.25.

" " 6, 37.25.

We also furnish the Nos. 5 and 6 for power, with tight and loose pulleys applied to balance wheel shaft, 7 inches diameter, $2\frac{1}{4}$ inch face.

Price, No. 5, \$24.50

" " 6, 31.00



FIG. 460.

The Grinder Attachment, Fig. 460, is a very useful fixture; it can be used with all of the Burnham drills, excepting drill shown in Fig. 453. It is shown applied to the No. 2 drill, Fig. 456. Is very simple and effective in operation, the power being obtained by fly-wheel on small friction wheel. It is brought into use by the tightening of a thumb-screw, and provides a rest for grinding the drill bit correctly.

The emery wheel furnished with this Attachment is 5 inches in diameter, and $\frac{1}{4}$ inch thick. This Attachment is not included in the price of drills, but is furnished at an extra cost of \$2.50.

For fear that some may overlook the article printed on page 96, in connection with Drill Chucks, we deem it best to repeat here.

"Notwithstanding the largely increased demand for Drill Chucks, there are a great many users of drills who have never been led to see the advantages of chucks from an economical point of view. Out of the many thousands of drill presses sold every year, not one in a hundred is supplied with a chuck. With very few exceptions, all the blacksmith drill presses sent out have half inch hole in socket to suit Prentice Drills (Fig. 364, page 91), or $\frac{3}{4}$ inch Coe's Drills (Fig. 363, page 90).

At least eighty per cent. of drills used are $\frac{1}{4}$ inch and under, and the straight shank drills in the smaller sizes are very much less in price than either the Coe's or Prentice style of drill. This fact can be readily ascertained by comparing the price-lists of drills. As an example, a $\frac{1}{4}$ inch Coe's drill sells for thirty cents, while the same size straight shank drill sells for eleven cents.

If many drills are used, the saving will pay for a chuck in a short time; besides, a small drill held in a chuck is stronger than the same size drill with a larger shank. Figs. 380 and 381 show Arbors fitted for drill presses, and we can furnish any of the Drill Chucks shown with these arbors, and at moderate cost.

Another advantage of the Drill Chuck is, that Countersinks, Reamers and other tools, can be made of any round stock that is at hand and used in chuck."

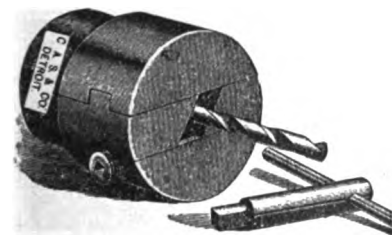


FIG. 461. EMPIRE DRILL CHUCK.

We sell notably more of the "Empire" Chucks—for use on Blacksmiths' Drills—than of any other. No. 7 holds from 0 to $\frac{1}{4}$ inch; No. 8 to $\frac{3}{4}$ inch. Price, fitted with either $\frac{1}{4}$ or $\frac{3}{4}$ shank, No. 7, \$5.45; No. 8, \$6.25.

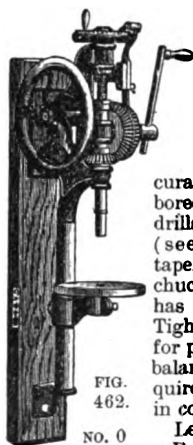


FIG. 462.

NO. 0
BOYNTON AND
PLUMMER DRILL.

This size, Fig. 462, is for small, accurate work, and is a desirable tool for amateurs, electrotypers and experimenters. The spur gearing is turned, finished, and accurately cut; spindle is bored to receive Prentice drills with $\frac{1}{4}$ inch shank (see page 91); end is tapered to receive small chucks for wire drills; it has three grades of feed. Tight and loose pulleys for power can be added to balance-wheel shaft, if required, at slight advance in cost.

Length, 36 inches.

Price, \$14.75.

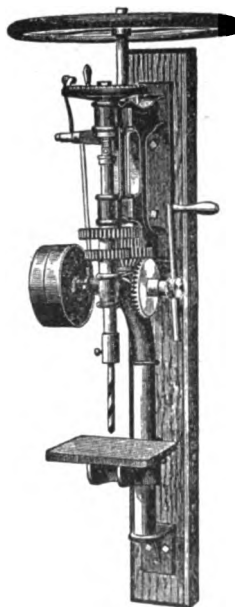


FIG. 463.

NO. 3 BOYNTON
AND PLUMMER DRILL.

Fig. 463, No. 3, has Cut Gears so arranged that quick or slow motion is given to the spindle, as light or heavy work may require, and is a desirable tool for the machine shop or factory, often taking the place of more costly machines. Drills to centre of 19 inch circle; spindle will take Coe's drills $\frac{3}{4}$ inch shank; can be used as hand and power, or either independently. Pulleys, 10 x 2 $\frac{1}{2}$ inches; speed for ordinary work about 180 revolutions per minute; it drills from 0 to 1 $\frac{1}{4}$ inch hole. Price for Hand use, \$45.00; for Power and Hand (see cut), \$47.50.

The Blacksmiths' Drills, illustrated and described below, are of the Champion Blower & Forge Co.'s make. These drills are furnished at a very low price, and are sold in large numbers; in many places and for many purposes they serve very well. They are equal in quality to some others, for which a greater price is asked.

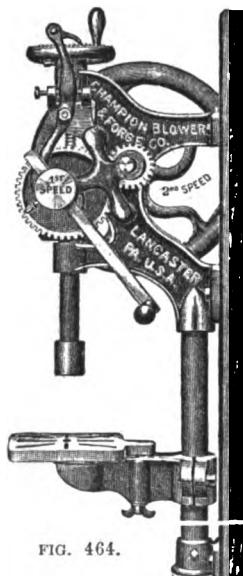


FIG. 464.

NO. 4 CHAMPION DRILL.
(Not illustrated.)

The No. 4 Champion Drill is built somewhat similar to drill shown in Fig. 464, but is larger and stronger and intended for much heavier work. Main driving gear is 10 inches in diameter. Drill is back geared. Will drill to the centre of an 18 inch circle. Spindle is bored to take Prentice $\frac{1}{2}$ inch shank drills. It weighs 185 pounds. Price, \$15.00. Can be furnished for power with tight and loose pulleys, at an advance of \$3.00.

NO. 7 CHAMPION DRILL.
(Not illustrated.)

The No. 7 Champion Drill is a facsimile—or rather an imitation—of the Boynton & Plummer No. 3, illustrated and described on page 121, Fig. 463. Price, for hand use, \$32.00; with tight and loose pulleys for power, \$35.00.

Fig. 464 is an illustration of the original "Champion" \$10.00 Post Drill. This drill is double geared, and will drill to centre of 14 $\frac{1}{2}$ inch circle. Diameter of spindle, 1 $\frac{1}{2}$ in. Length, 13 in. Screw has a feed of 4 inches with automatic feed. The spindle is bored to take Prentice $\frac{1}{2}$ in. shank drills. It is mounted on a hard wood plank, 4 feet long, 6 inches wide. Price of drill, as shown, \$8.00.

FIG. 465.

HAND AND POWER
BENCH DRILL.

Fig. 465 represents a well made, strong and substantial Bench Drill for hand or power.



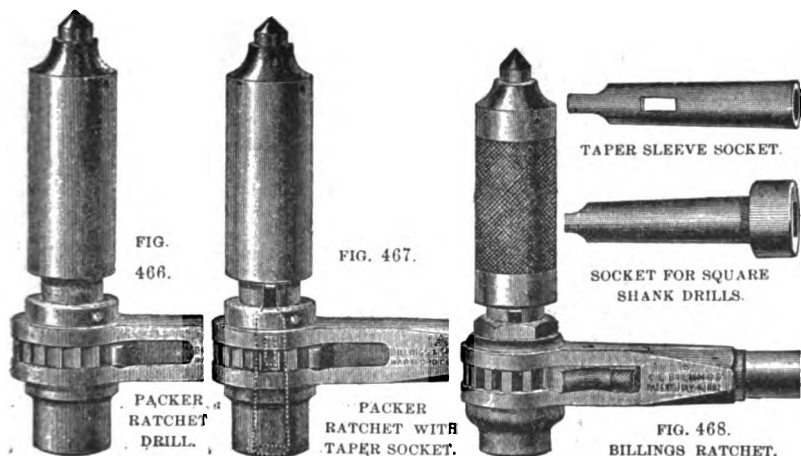
We have had this tool made especially to our order, and it is designed to meet the wants of a large class of users, who desire, at a moderate price, a tool suitable for drilling holes up to $\frac{1}{2}$ inch. It drills to the centre of a 10-inch circle. Diameter of Spindle, 1 $\frac{1}{2}$ inches; length, 10 inches. Is provided with a regular countershaft, having tight and loose and Cone pulleys. Socket takes Prentice drills $\frac{1}{2}$ inch round shank. Price, complete with countershaft, \$24.50.

COMPLETENESS—This *Book of Tools* does not consist in showing or describing every known style of Tool or Machine.

If we undertook to do this, we should have a book so unwieldy in size, that our fondest hope (that of placing a copy in the hands of every tool user) would be defeated. Beside this, its size would prevent its being used constantly as a book of reference, which, in itself, is a most desirable feature.

On the other hand there must be variety, in accordance with customers' requirements, and—pocket books. And this variety we have made an effort to maintain throughout catalogue.

Where it has seemed necessary to present different lines of the same kind of tools, we have in all cases shown the very best in their respective classes.



RATCHET DRILLS.

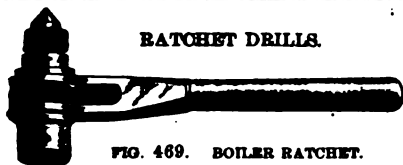


FIG. 469. BOILER RATCHET.

The three styles of Ratchet Drills, shown above, represent the strongest and most generally useful types.

The Packer Ratchet, Fig. 466, is perhaps the best known in the market. There are several makers of this style of Ratchet, but we prefer to sell the Billings & Spencer Co's make, as they are drop-forged from bar steel, while most of the other makes are of malleable iron.

We can furnish extra parts for the Billings & Spencer Packer Ratchets.

No. 1,	\$4.25,	has 10 inch handle.
" 2,	5.40,	" 12 " "
" 3,	6.40,	" 15 " "
" 4,	7.60,	" 17 " "
" 5,	9.20,	" 20 " "

Packer Boiler Ratchet, Fig. 469, is similar to the regular ratchet, except that it has a shorter sleeve and can be used in narrower spaces. Is made in two sizes.

No. 1,	\$3.60,	has 10 inch handle.
" 2,	4.25,	" 12 " "

Fig. 467. represents a new form of Packer Ratchet with Taper Socket to take Taper Shank Drills; by the use of extra

sockets, any one of these sizes of ratchets takes from $\frac{1}{4}$ inch up to its full capacity.

No. 2. \$7.20. 12 inch handle, takes Taper Shank Drills, from $\frac{1}{4}$ to $\frac{3}{4}$ inch.

No. 3, \$9.00. 15 inch handle, takes Taper Shank Drills from $\frac{1}{4}$ to $1\frac{1}{2}$ inch.

No. 4, \$11.25. 17 inch handle, takes Taper Shank Drills from $1\frac{1}{2}$ to 2 inch, inclusive.

Extra Taper Sockets for drills from $\frac{1}{4}$ to $\frac{3}{4}$, \$1.45; $\frac{3}{4}$ to $1\frac{1}{2}$, \$1.90; $1\frac{1}{2}$ to $2\frac{1}{2}$, \$2.40.

Sockets to fit Ratchet Twist Drills, or Flat Drills, Fig. 470, for either No. 2 or 3 Morse Taper, \$1.60 each.

Billings' Double-Action Ratchet, Fig. 468, can be changed from right to left hand, by simply moving the pawl.

No. 1, \$11.20. 11 inch handle, with one Socket, taking Taper Shank Drills from $\frac{1}{4}$ to $\frac{3}{4}$ inch, and one socket taking flat drills.

No. 2, \$13.60. 14 inch handle, with two Sockets, taking Taper Shank Drills from $\frac{1}{4}$ to $1\frac{1}{2}$ inch, and one socket for flat drills.



FIG. 470. FLAT DRILL.

Size,	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$1\frac{1}{2}$ in.	$2\frac{1}{2}$ in.
Price,	\$0.40	.40	.40	.45	.45
Size, 1 in.	$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.
Price,	\$0.45	.50	.55	.60	.65



FIG. 471.

WORCESTER TWIST-DRILL GRINDER.

We know of no machine that has met with more general favor than the Worcester Drill Grinder. Until this was brought out a few years ago, the only machines of this kind on the market, that were worth using, were entirely too high priced for general use. We have used the different kinds, and, in our judgment, the Worcester Grinder far surpasses all others.

In the short time since they were placed on the market, there have been upwards of 800 sold, and such concerns as The Pratt & Whitney Co., Brown & Sharpe Mfg Co., R. Hoe & Co., F. E. Reed & Co., and Knowles' Loom Works, have given them their unqualified approval.

The machine is so simple that an expert is not needed; all that is required is to drop the drill in place, as shown in cut, where it will be held perfectly, and ground true with the body of drill. The machine grinds drills to the angle recommended by the leading manufacturers, viz.: 59 degrees.

No. 1 grinds drills from $\frac{1}{4}$ to 2 inches. Price, arranged for bench use, \$55.00; countershaft for same, \$10.00; complete with countershaft, and mounted on pedestal, as shown in Fig. 471, \$75.00.

No. 2 grinds drills from $\frac{1}{8}$ to $\frac{1}{2}$ inches. Price, arranged for bench use, \$45.00; countershaft for same, \$10.00; complete with countershaft, and mounted on pedestal, as shown in Fig. 471, \$65.00.

Full descriptive circular mailed upon application.

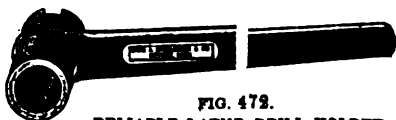


FIG. 472.

RELIABLE LATHE DRILL HOLDER.

In this holder the lathe centre enters the centre hole in the shank of drill, and consequently the drill must be in a true line with the centres of lathe.

No.	Each.	Holds Drills.	Length.	Weight.
1,	\$0.65	$\frac{1}{4}$ to $\frac{1}{2}$	8 $\frac{1}{2}$ in.	$\frac{1}{2}$ lb.
2,	.85	$\frac{1}{2}$ " $\frac{3}{4}$	10 " "	1 " "
3,	.95	$\frac{3}{4}$ " 1 $\frac{1}{2}$	11 $\frac{1}{2}$ " "	2 " "
4,	1.10	1 $\frac{1}{2}$ " 2	14 $\frac{1}{2}$ " "	4 " "

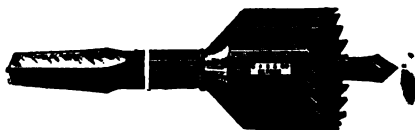


FIG. 473. STOVE DRILL.

This drill is designed for drilling stoves in making gas and water-back connections; is extremely useful for drilling all kinds of thin plate.

No. 1,	\$2.75,	suitable for	$\frac{1}{2}$ inch pipe
" 2	3.00	"	" 1 " "
" 3	3.50	"	" 1 $\frac{1}{2}$ " "
" 4	3.75	"	" 1 $\frac{3}{4}$ " "

Larger sizes furnished to order.

KNURLS, OR MILLING WHEELS.

These are used for checking cylindrical pieces, so that they may be held firmly by hand. We present here a very complete line of the more commonly used styles. We can furnish a great variety, besides those shown.

Price, each, 40 cents, postage paid.

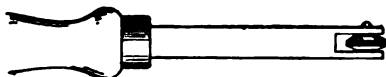
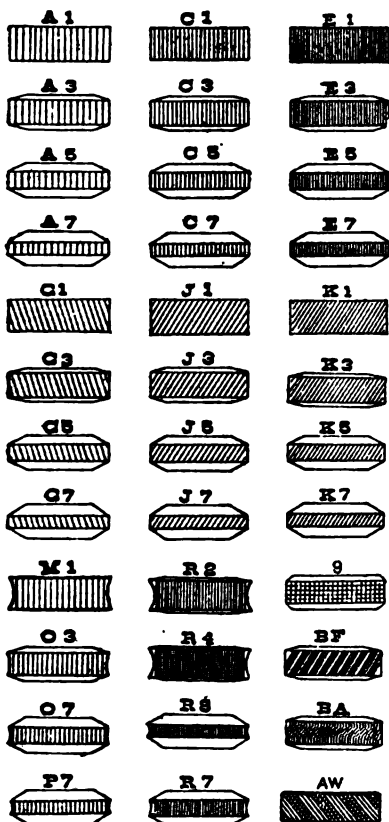


FIG. 475. KNURL HOLDER. 60 cts.
Postage, 8 cts.

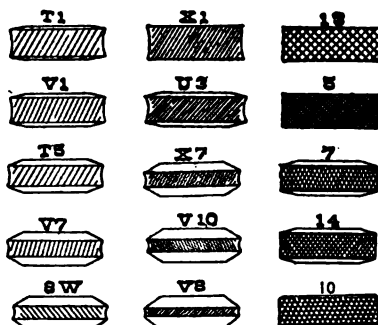


FIG. 474.

These Knurls measure from $\frac{1}{4}$ to $\frac{3}{4}$ inch on face.



FIG. 476. KNURLING TOOL.

The Knurling Tool (Fig. 476) is intended to be used in a tool-post. Any desired length can be milled, after the manner of turning in an engine lathe with continuous feed. The holder is jointed that the knurls may centre themselves.

Size of holder, $\frac{1}{4}$ x 1 inch, 6 inches long. Weight, 17 ounces.

Price, with one pair of knurls, \$6.00
" without knurls, 5.00

Extra knurls, per pair, \$1.00, postpaid

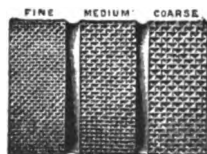


FIG. 478.

Fig. 478 shows style of knurls furnished for use with Knurling Tool. Any one of the three will be sent, as may be selected. The pitch of these measured parallel to axis of the work, is about 20 to the inch for the fine knurls, 12 for medium, and 8 for coarse.

SAWS FOR METAL, MILLING CUTTERS, ETC.

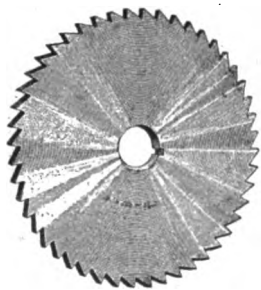
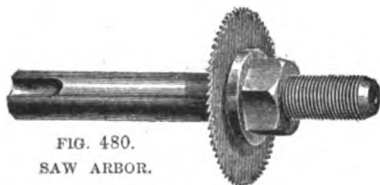


FIG. 479.

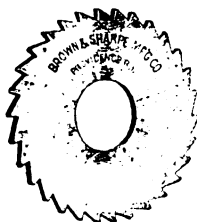
Fig. 479 is a plain Circular Saw, for sawing metals, ivory, bone, etc., etc. We sell a great many of the larger sizes, from 5 to 8 inches, for use in sawing tubing and sprues on castings. They are made in an almost endless variety of sizes. The following are the diameters carried in stock:

Diam., 1½ in.	2 in.	2½ in.	3 in.	4 in.
Each, \$0.15	.20	.25	.35	.65
Diam., 5 in.	6 in.	7 in.	8 in.	
Each, \$1.25	1.65	2.00	2.50	

FIG. 480.
SAW ARBOR.

Saw Arbor, Fig. 480, has hardened ends.

Arbor No.	0	2	3	4	5
Each,	\$1.00	1.25	1.50	2.00	2.50
Saw End,	½ in.	¾ in.	1 in.	1½ in.	2 in.

FIG. 481.
METAL SLITTING SAWS.

These are thin Milling Cutters with sides ground true. They are hardened, and are a little thicker at the outer edge than near the centre, so as to give proper clearance in cutting deep slots.

All sizes have 1 inch hole.

Diam.	Each.	Thick.	Diam.	Each.	Thick.
3 in.	\$1.05	1 in.	4 in.	\$1.05	1 in.
8 "	.95	1 in.	4 "	1.00	1 in.
3 "	.85	1 in.	4 "	1.00	1 in.
3 "	.85	1 in.	5 "	1.55	1 in.
3 "	.85	1 in.	5 "	1.30	1 in.
4 "	1.25	1 in.	5 "	1.25	1 in.

FIG. 482.
SCREW SLOTTING CUTTERS.

These Cutters have a fine pitch of teeth especially adapted for the slotting of screw heads and similar work.

All Cutters carried in stock are 2½ inches in diameter, and are furnished with 1 inch holes unless otherwise specified.

B. & S. Gauge No.	Each.	Thick in Decim.	B. & S. Gauge No.	Each.	Thick in Decim.
8	\$0.60	.128	20	\$0.15	.032
9	.50	.114	21	.15	.028
10	.40	.109	22	.15	.025
11	.35	.091	23	.15	.023
12	.30	.081	24	.15	.020
13	.25	.079	25	.15	.018
14	.20	.064	26	.15	.016
15	.15	.057	27	.15	.014
16	.15	.051	28	.15	.012
17	.15	.045	30	.15	.010
18	.15	.040	32	.15	.008
19	.15	.035	34	.15	.006

The above list gives the sizes of Screw Slotting Cutters in most general use. We can furnish promptly, a large variety of these, with holes ranging from ½ to 1 inch, and in diameter, from 1½ to 2½ inches. We also make special prices on Screw Slotting Cutters in large quantities.



FIG. 483.

SCREW SLOTTING CUTTER ARBOR.

These are furnished to fit holes ½, ¾, and 1 inch. Price, each, \$2.50.

FIG. 484.
Each, \$1.00.

The Emery Wheel shown in Fig. 484, is used for grinding milling cutters of all kinds. It has ½ inch hole.



FIG. 485.

The plain Milling Cutter, Fig. 485, with a face one inch and wider, have teeth of the spiral form, as they cut easier and make a smoother surface, than cutters with teeth cut parallel with the axis.

All sizes are $2\frac{1}{2}$ inches in diameter, and are furnished with 1 inch holes. Any required size, not given in the following list, made to order.

Width of Face.	Price, each.	Width of Face.	Price, each.
$\frac{1}{4}$ inch.	\$1.10	$\frac{1}{4}$ inch.	\$2.05
$\frac{1}{2}$ "	1.20	1 "	2.20.
$\frac{3}{4}$ "	1.30	$1\frac{1}{4}$ "	2.45
1 "	1.35	$1\frac{1}{2}$ "	2.65
$1\frac{1}{4}$ "	1.45	$1\frac{3}{4}$ "	2.90
$1\frac{1}{2}$ "	1.55	2 "	3.15
$1\frac{3}{4}$ "	1.65	$2\frac{1}{4}$ "	3.50
2 "	1.70	3 "	3.80
$2\frac{1}{4}$ "	1.80	$3\frac{1}{4}$ "	4.25
$2\frac{1}{2}$ "	1.85	4 "	4.65
$2\frac{3}{4}$ "	1.95		



FIG. 486.

The Side Milling Cutters, Fig. 486, are often used in pairs for sizing nuts, bolt heads, etc., and are oftentimes called "Straddle Mills."

This style of Milling Cutter makes it necessary for the diameter of hole to vary with diameter of cutter. We advise using the largest possible diameter, as it is more economical and profitable to the user.

Diameter.	Price, Each.	Width of Face.	Hole.
$2\frac{1}{2}$ inches.	\$1.85	$\frac{1}{4}$ inch.	$\frac{1}{4}$ inch.
$2\frac{1}{4}$ "	1.90	$\frac{1}{2}$ "	$\frac{1}{2}$ "
$2\frac{3}{4}$ "	1.95	$\frac{3}{4}$ "	$\frac{3}{4}$ "
3 "	2.05	1 "	1 "
3 "	2.10	$1\frac{1}{4}$ "	1 "
3 "	2.40	$1\frac{1}{2}$ "	1 "
4 "	4.00	$1\frac{3}{4}$ "	1 "
5 "	5.10	2 "	1 "
6 "	7.20	$2\frac{1}{4}$ "	$1\frac{1}{4}$ "
7 "	14.45	$2\frac{1}{2}$ "	$1\frac{1}{2}$ "
8 "	19.55	$2\frac{3}{4}$ "	$1\frac{3}{4}$ "

We will be pleased to furnish estimates for making any special Mills, plain or interlocking for special purposes. All inquiries will receive prompt and careful attention.



FIG. 487.

Fig. 487 shows a Right-Hand Angular Cutter. This style of cutter is used to cut (or mill) the teeth in Milling Cutters. Furnished in 50° , 60° , 70° , and 80° angles both right and left hand.

Diameter, $2\frac{1}{2}$ inches, \$2.30, hole, $\frac{1}{4}$ inch.
 " $2\frac{1}{4}$ " 2.55 " 1 "

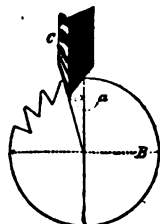


FIG. 488.

Diameter, $2\frac{1}{2}$ inches, \$2.30, hole, $\frac{1}{4}$ inch:
 " $2\frac{1}{4}$ " 2.55 " 1 "

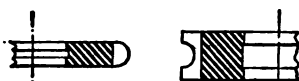


FIG. 489.

Convex and Concave Cutters, Fig. 489, for Milling half circles, like most of the others, can be sharpened by grinding without changing their form. All sizes below have $\frac{1}{4}$ inch hole. Can furnish larger sizes if desired.

Diam. of Circle.	Convex Cutter.	Concave Cutter.	Diam. of Cutter.
$\frac{1}{4}$ inch,	\$1.70	\$2.05	2 inches.
$\frac{1}{2}$ "	2.15	2.55	2 "
$\frac{3}{4}$ "	2.65	3.15	2 "
1 "	3.05	3.65	$2\frac{1}{4}$ "
$1\frac{1}{4}$ "	3.40	4.10	$2\frac{1}{2}$ "
$1\frac{1}{2}$ "	3.75	4.50	$2\frac{3}{4}$ "
$1\frac{3}{4}$ "	4.10	4.90	$3\frac{1}{4}$ "



FIG. 490.



FIG. 491.

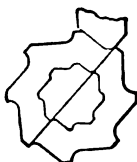


FIG. 492.

TAP.

REAMERS.

Cutter for grooving Taps and Reamers. see following page.

CUTTERS FOR GROOVING TAPS AND REAMERS.

No. 1 Cutter is suitable for grooving taps $\frac{1}{8}$ inch or less diameter; No. 2 for taps larger than $\frac{1}{8}$ inch and up to $\frac{1}{2}$ inch diameter, etc. (See Fig. 491, preceding page).

No.	Each.	Diameter of Tap.	Diameter of Cutter.
1	\$1.70	0 to $\frac{1}{8}$ inch.	$1\frac{1}{2}$ inch.
2	1.80	$\frac{1}{8}$ " $\frac{1}{4}$ "	$1\frac{1}{2}$ "
3	1.90	$\frac{1}{4}$ " $\frac{3}{8}$ "	$1\frac{1}{2}$ "
4	2.05	$\frac{3}{8}$ " $\frac{1}{2}$ "	2 "
5	2.30	$\frac{1}{2}$ " $\frac{5}{8}$ "	$2\frac{1}{2}$ "
6	2.55	$\frac{5}{8}$ " $\frac{3}{4}$ "	$2\frac{1}{2}$ "
7	2.80	$\frac{3}{4}$ " $\frac{7}{8}$ "	$2\frac{1}{2}$ "
8	3.05	$\frac{7}{8}$ " 2 "	$2\frac{1}{2}$ "

The above cutters have $\frac{1}{8}$ inch holes.

These Cutters are also adapted for fluting Reamers, for which purpose it is necessary only to cut one or more grooves of a less depth, in order to flute unevenly. (See Fig. 492, preceding page).

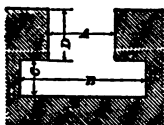


FIG. 495.

Cutters are made $\frac{1}{8}$ inch larger in diameter than the figures given, to allow for sharpening.

Fig. 495 is a sketch illustrating different points of measurement.

No.	Each.	Width Slot A.	Diam. Neck Cutter.	Width Slot B.	Depth C.	Lim. D.
4	\$1.30	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
7	1.35	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
10	1.55	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
13	1.80	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
16	1.70	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
19	1.90	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
22	2.00	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
25	2.15	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
28	2.90	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
31	2.40	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
34	2.65	$\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
37	2.95	$\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

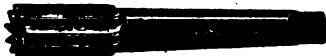


FIG. 493. LEFT-HAND END MILL.

Diameter.	Each.	Length of Cut.	Length.
$\frac{1}{8}$ inch.	\$0.85	$1\frac{1}{8}$ inch.	$2\frac{1}{8}$ inch.
$\frac{1}{4}$ "	0.85	$\frac{1}{2}$ "	$2\frac{1}{8}$ "
$\frac{3}{8}$ "	0.95	$\frac{3}{8}$ "	$2\frac{1}{8}$ "
$\frac{1}{2}$ "	0.95	$1\frac{1}{8}$ "	$2\frac{1}{8}$ "
$\frac{5}{8}$ "	1.10	1 "	$3\frac{1}{8}$ "
$\frac{3}{4}$ "	1.15	1 "	$3\frac{1}{8}$ "
$\frac{7}{8}$ "	1.45	$1\frac{1}{8}$ "	$5\frac{1}{8}$ "
$1\frac{1}{8}$ "	1.50	$1\frac{1}{8}$ "	$5\frac{1}{8}$ "
$1\frac{1}{4}$ "	1.55	$1\frac{1}{8}$ "	$5\frac{1}{8}$ "
$1\frac{3}{8}$ "	1.65	$1\frac{1}{8}$ "	$5\frac{1}{8}$ "
$1\frac{1}{2}$ "	1.80	$1\frac{1}{8}$ "	$5\frac{1}{8}$ "
1 "	1.85	$1\frac{1}{8}$ "	6 "
$1\frac{1}{8}$ "	1.95	2 "	$6\frac{1}{8}$ "
$1\frac{1}{4}$ "	1.95	2 "	$6\frac{1}{8}$ "

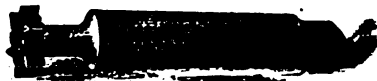


FIG. 494. T SLOT CUTTER.

The above cut represents a left-hand T Slot Cutter, or Mill. The left-hand Cutters are the most commonly used. Can furnish right-hand Cutters, as well as other sizes, to order. These Cutters are made by Brown & Sharpe, and the shanks are turned and fitted to the special collets, adapted by them for use in their milling machines. A list of these Collets will be sent upon application.

This BOOK OF TOOLS is compiled, printed and issued for the benefit of those who are interested in the manufacture of tools, machinery and supplies of all kinds, and—incidentally—to promote the extension of our own business.

Having an experience of over twenty-five years in the lines represented, we feel that we are fairly well qualified to state that this book, in many ways, fills a long-felt want; and we claim for it a number of unique features, among which are the following:

FIRST. There are represented more diverse lines of goods than have ever been illustrated before in any one catalogue.

SECOND. The descriptions of articles are much more complete and comprehensive than is usual in publications of this kind.

THIRD. It is, as far as possible, free from the misstatements and boastful claims so commonly found in both manufacturers' and dealers' catalogues and circulars.

FOURTH. It contains but a very small amount of useless matter. Instead of "padding out" and trying to see how large a variety of goods could be shown in each line—without respect to merit—we have simply placed, in the various lines, the goods that we know to be the best.



FIG. 496.



FIG. 497.



FIG. 498.

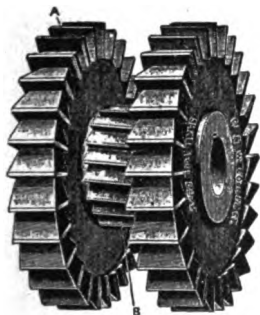


FIG. 499.

In Figs. 496 to 503 we show a variety of what may be termed "Special" Milling Cutters.

Fig. 496 shows a Cutter for milling flutes in Twist Drills.

Fig. 497 shows a Milling Cutter of irregular form.

Fig. 498 shows a Worm Hob, the teeth of which can be ground on face without changing the form.

Fig. 499 shows a Gang of Mills, consisting of two Side Mills and one Plain.

Fig. 500 shows two Side Mills, with irregularly formed interlocking Cutters.

Fig. 501 shows a Gang of Cutters, including Side and Plain Mills, with interlocking Cutters.

Figs. 502 and 503 illustrate forms of inserted tooth Cutters.

Nearly all of above shown Cutters can be used in Gangs, limited in size only by power and capacity of Milling Machine.

We will be pleased to furnish any information that lies in our power, in regard to all matters relating to Milling Cutters for any purpose.

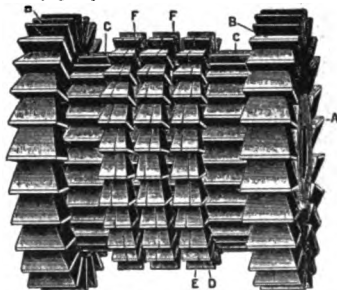


FIG. 501.

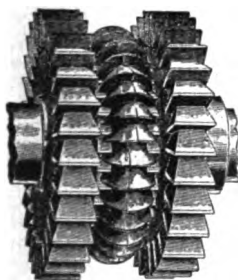


FIG. 500.

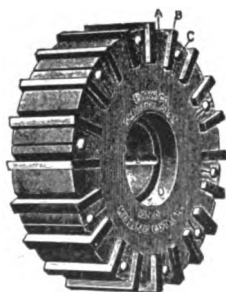


FIG. 502.



FIG. 503.

GEAR CUTTERS.

We desire to call the attention of machinists to Brown & Sharpe's Patent Cutters for teeth of Gear Wheels, which, from their peculiar construction, may be sharpened when dull by grinding the faces of the teeth. This operation can be repeated without altering the form of the tooth which the cutter makes, thereby rendering them many times more valuable than cutters of ordinary form.

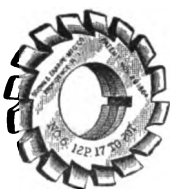


FIG. 504.

As these Cutters allow of being ground when dull, it is important that they be kept sharp. By paying particular attention to this, cutting will be greatly facilitated besides being much better done.

The Cutters should not be crowded too hard, especially when cutting through at the end of the tooth. The depth of the space made by these cutters affords ample clearance, as it exceeds the working depth of the tooth by an amount equal to one-tenth of the thickness of the tooth on the pitch line.

These Gear Cutters have a centre line which is very valuable in setting cutters central with the work spindle.

According to the system devised by the Brown & Sharpe Mfg. Co., eight different cutters are required to cut from a pinion of twelve teeth to a rack, for each pitch. Illustration: If a cutter is wanted for a wheel of 40 teeth of 8 pitch, then the cutter required would be No. 3 of 8 pitch, inasmuch as a No. 3 cutter will cut all wheels containing from 35 to 54 teeth, inclusive, and 40 occurring between those numbers, that, of course, is the one desired.

No. 1 will cut from 135 teeth to a rack.

" 2	"	"	55	"	"	134	teeth.
" 3	"	"	35	"	"	54	"
" 4	"	"	26	"	"	34	"
" 5	"	"	21	"	"	25	"
" 6	"	"	17	"	"	20	"
" 7	"	"	14	"	"	16	"
" 8	"	"	12	"	"	13	"

In ordering, give the number of cutter and the diametral pitch required.

Form of order: "Send one cutter, No. five, eight pitch."

Diametral Pitch.	Each.	Diameter of Cutter in Inches.	Hole in Cutter in Inches.
*2	\$10.63	5	1½
*2½	9.56	4½	1½
*2½	8.50	4½	1½
*2½	7.65	4	1½
3	5.95	3½	1½
*3½	5.53	3½	1½
*3½	5.31	3½	1½
*3½	5.10	3½	1½
4	4.68	3½	1½
*4½	4.25	3½	1½
5	3.83	3½	1½
*5½	3.57	2½	1½
6	3.32	2½	1½
7	3.06	2½	1½
8	2.89	2½	1½
9	2.72	2½	1½
10	2.55	2½	1½
11	2.34	2½	1½
12	2.25	2	1½
*13	2.21	2	1½
14	2.17	2	1½
*15	2.13	2	1½
16	2.08	1½	1½
18	2.00	1½	1½
20	1.96	1½	1½
22	1.87	1½	1½
24	1.79	1½	1½
26	1.66	1½	1½
28	1.53	1½	1½
30	1.53	1½	1½
32	1.53	1½	1½
36	1.53	1½	1½
*38	1.53	1½	1½
40	1.53	1½	1½
*44	1.53	1½	1½
48	1.53	1½	1½
*50	1.53	1½	1½
*56	1.53	1½	1½
*60	1.53	1½	1½
*80	1.53	1½	1½
*120	1.53	1½	1½

CUTTERS OF EXTRA LARGE DIAMETER.

Diametral Pitch.	Each.	Diameter of Cutter in Inches.	Hole in Cutter in Inches.
3	\$6.80	4½	1½
4	5.31	4½	1½
5	4.46	4	1½
6	4.04	3½	1½
8	3.61	3½	1½

All Cutters with special size holes are made to order only, at 50 cents advance on above list prices.

Cutters marked * are not kept in stock, but are made to order.

CUTTERS FOR BEVEL AND MITRE GEARS.

The carrying in stock of many of the more commonly used sizes of Bevel and Mitre Gear Cutters is a new departure, and will doubtless be appreciated as a means of saving time.

Diametral Pitch.	Each Cutter.	Diameter of Cutter.	Hole in Cutter.
4	\$4.68	3 $\frac{1}{4}$ inch.	1 $\frac{1}{4}$ inch
5	3.83	3 $\frac{1}{8}$ "	1 $\frac{1}{8}$ "
6	3.32	2 $\frac{1}{2}$ "	1 $\frac{1}{8}$ "
8	2.89	2 $\frac{1}{4}$ "	1 $\frac{1}{8}$ "
10	2.55	2 $\frac{1}{8}$ "	$\frac{1}{2}$ "
12	2.25	2 "	$\frac{1}{2}$ "
14	2.17	2 "	$\frac{1}{2}$ "
16	2.08	1 $\frac{1}{2}$ "	$\frac{1}{2}$ "
20	1.96	1 $\frac{1}{4}$ "	$\frac{1}{2}$ "
24	1.79	1 $\frac{1}{8}$ "	$\frac{1}{2}$ "

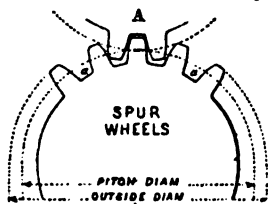


FIG. 505.

A FEW SUGGESTIONS ON GEARING.

Spur gear blanks are always of the same denomination as the pitch. The diameter of an 8 pitch gear cannot be in 10ths or 12ths of an inch, nor a 16 pitch in 30ths or 40ths; but a 6 pitch gear is always in 6ths, a 10 pitch in 10ths, a 48 pitch in 48ths, etc., etc.

DIAMETRAL PITCH.

The diametral pitch of a gear is the number of teeth to each inch of its pitch diameter.

DIAMETER.

The word "diameter," when applied to gears, is always understood to mean the pitch diameter. (See Fig 505).

To find the outside diameter of spur gear blanks, add two parts of the pitch to the pitch diameter, thus: For an 8 pitch gear of 40 teeth, the outside diameter of blank is 49-8ths, equal to 5 $\frac{1}{4}$ inches; for a 12 pitch gear of 36 teeth, the outside diameter of blank is 38-12ths, equal to 3 $\frac{1}{3}$ inches; for a 16 pitch gear of 48 teeth, the outside diameter of blank is 48-16ths, equal to 3 inches. This rule applies to gears of any pitch, and if always

at hand will insure blanks of the right size, saving time and annoyance.

DISTANCE.

To obtain the distance between the centres of two gears, add the number of teeth together, and divide half the sum by the diametral pitch, thus: If two gears have 40 and 30 teeth respectively, and are 5 pitch, add 40 and 30, making 70, divide by 2, and then divide the quotient 35 by the diameter pitch 5, and the result, 7 inches is the distance between centres.

WHOLE DEPTH.

To obtain the whole depth of a tooth, divide 2.157 by the diametral pitch, thus: If the diametral pitch of a gear is 6, the whole depth is 2.157 divided by 6, which equals .3595.

Table showing depth of space and thickness of tooth in Spur Wheels, when cut with Brown & Sharpe's patent cutters.

Pitch of Cutter.	Depth to be Cut in Gear.	Thickness of Tooth at pitch line.
2	1.078 inch.	.785 inch.
2 $\frac{1}{2}$	.958 "	.697 "
2 $\frac{3}{4}$	.863 "	.628 "
3	.784 "	.570 "
3 $\frac{1}{2}$	.719 "	.523 "
4	.616 "	.448 "
5	.539 "	.393 "
6	.431 "	.314 "
7	.359 "	.262 "
8	.308 "	.224 "
9	.270 "	.196 "
10	.240 "	.175 "
11	.216 "	.157 "
12	.196 "	.143 "
13	.180 "	.131 "
14	.154 "	.112 "
16	.135 "	.098 "
18	.120 "	.087 "
20	.108 "	.079 "
22	.108 "	.071 "
24	.090 "	.065 "
26	.083 "	.060 "
28	.077 "	.056 "
30	.072 "	.052 "
32	.067 "	.049 "
36	.060 "	.044 "
40	.054 "	.039 "
48	.045 "	.033 "

"PRACTICAL TREATISE ON GEARING," for those who wish to obtain practical explanations and directions in the making of Gear Wheels. Sent by mail upon receipt of price. Bound in cloth, \$1.50; in card-board, \$1.00.



FIG. 506. STUBS' BROACHES (OR REAMERS.)

Length of cutting edge,	8	7	6½	6	5½	5	4½	4¼	4½	4	inches.
Diameter of larger end,	1½	1¼	1	¾	¾	¾	¾	¾	¾	¾	"
Price, each	\$0.80	.60	.50	.45	.40	.35	.30	.30	.25	.25	
Length of cutting edge,	3½	3½	3½	3½	3	3	2½	2½	2½	2½	
Diameter of large end,	.130	.161	.150	.129	.110	.098	.082	.070	.052	.032	in decimals,
No. by Drill Rod Gauge,	15	20	25	30	35	40	45	50	55	to pivot	
Price of each,	\$0.20	.15	.15	.15	.10	.10	.10	.10	.10	.10	



FIG. 507. CENTRE REAMER, 60°.

The Centre Reamers, Fig. 507, are thoroughly inspected as to correctness of angle and temper; are relieved in a way which will be appreciated by the user. The reamer being fluted with three cuts, will, in all cases, make a round hole, which is not always the case with the one-cut reamer. Can be sharpened by grinding without changing its form.

Diam. of shank,	1½	1	¾	¾	inch.
Size of cut,	1½	1	¾	¾	"
Price, each,	\$0.25	.30	.40	.75	



FIG. 508

LIGHTNING MACHINE COUNTERSINK.



FIG. 509.

LIGHTNING BRACE COUNTERSINK.

The Countersinks, Figs. 508 and 509, are furnished with 60 or 80 degrees angle. Can be sharpened without losing shape. For use in drilling machines or bit braces. The round shanks for drilling machines and lathes are ½ inch or ¾ inch in diameter.

Regular size, ½ inch cut, \$0.50 each.

Large size, ¾ " " .75 "



FIG. 510. ROSE COUNTERSINK.

Ordinary quality, 15 cts. each; extra quality, 25 cts. each.

The Rose Countersink, Fig. 510, is used for reaming holes in metal or hard wood to receive the heads of screws known as Flat Head.



FIG. 511. COMBINED DRILL AND CENTRE REAMER.

These have holes clear through, and receive Straight Fluted (Pod) or Twist Drills as desired. The Countersinking Cutter can be readily taken out to be ground.

Each tool carries only one size of drill. Shanks, ½ inch diameter, for drills ½ to ¾ inch.

Price of tools, without drills, \$1.50
Extra Countersinking Cutters, .20

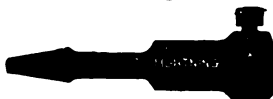


FIG. 512.

Chucks or Holders, for use in the bit brace, to take drills and other tools having round shanks, ½ inch or ¾ inch in diameter.



FIG. 513.

See other tools on page 122.

The Plain Hollow Mills, Fig. 513, are made from ½ inch stock. We can furnish any size from ½ to 1 inch by 32nds of an inch, and in machine screw sizes, from No. 4 to 14.



FIG. 514. PLUG.

The Plug, Fig. 514, can be bored to allow milled work to pass through. Price of Mills, all sizes, \$1.00 each; Plugs, 35 cents each.

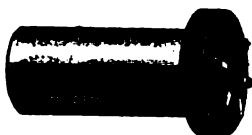


FIG. 515. ADJUSTABLE HOLLOW MILL.

The Adjustable Hollow Mills, Fig. 515, are an improvement over the Plain Hollow Mill, Fig. 513. They are made (according to the sizes) from stock $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, and are from $1\frac{1}{4}$ to $2\frac{1}{4}$ inches in length.

Size of Hole.	Price, Each.	Size of Hole.	Price, Each.
$\frac{1}{4}$ inch.	\$1.60	$\frac{1}{4}$ inch	\$2.00
$\frac{1}{2}$ "	1.60	$\frac{1}{2}$ "	2.00
$\frac{3}{4}$ "	1.60	$\frac{3}{4}$ "	2.20
1 "	1.80	1 "	2.60
1 $\frac{1}{4}$ "	1.80	1 $\frac{1}{4}$ "	3.00

The Counterbore shown in Fig. 516 is used for boring to receive the heads of Screws, Bolts, etc. The guide furnished with same is made the size of the body of the screws used. Shanks of counterbores, from $\frac{1}{4}$ to $\frac{1}{2}$ inch inclusive, are fitted to No. 1 Morse Taper; from $\frac{3}{4}$ to $1\frac{1}{2}$ inch inclusive, to No. 2 Morse Taper.

Diam. of Counter-bore.	Price, Each.	Diam. of Guide.	Full Length.
$\frac{1}{4}$ in.	\$1.40	$\frac{1}{4}$ in.	4 $\frac{1}{4}$ in.
$\frac{1}{2}$ "	1.40	$\frac{1}{2}$ "	4 $\frac{1}{4}$ "
$\frac{3}{4}$ "	1.40	$\frac{3}{4}$ "	4 $\frac{1}{4}$ "
1 "	1.40	1 "	4 $\frac{1}{4}$ "
1 $\frac{1}{4}$ "	1.50	1 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "
1 $\frac{1}{2}$ "	1.80	1 $\frac{1}{2}$ "	6 $\frac{1}{4}$ "
1 $\frac{3}{4}$ "	1.80	1 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "
2 "	2.00	2 "	6 $\frac{1}{4}$ "
2 $\frac{1}{2}$ "	2.00	2 $\frac{1}{2}$ "	6 $\frac{1}{4}$ "

FIG. 516.

COMPLAINTS.—We would ask our customers to report to us at the earliest possible time, any mistakes or defects in goods sent, without any hesitation and in plain language. We take the greatest pains, and mean to have everything right and satisfactory to our customers, and are more than willing to correct any errors that may occur.

[9]



HASWELL'S MECHANICS' AND ENGINEERS' POCKET-BOOK.

Mechanics' and Engineers' Pocket-Book of Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, with Areas, Squares, Cubes, and Roots, etc.; Logarithms, Steam and the Steam-Engine, Naval Architecture (including Displacement of Vessels, Cables, Chains, Anchor, etc.); Limes, Mortars, Cements, etc.; Orthography of Technical Words and Terms, etc. Fifty-seventh edition, revised and enlarged, by CHAS. H. HASWELL, Civil, Marine, and Mechanical Engineer; Member of Am. Soc. of Civil Engineers, and Academy of Sciences, New York; Institutions of Civil Engineers and of Naval Architects, England, etc. Leather covered, Pocket-Book Form, with 1000 pages, \$4.00; sent post-paid to any address in the United States, Canada or Mexico, on receipt of price.

"Certainly no book in the guise of a *vade-mecum* has arrived at such popularity in the United States as 'Haswell.' You will find it in the lumber-cutter's cabin in Maine, in the miner's shanty in Nevada, and on the work-bench of the mechanic in all parts of the country. It may be consulted for almost anything having to do with the sciences of numbers or the strength of material, whether it be of wood, metal, or stone, squares, cubes, roots, sines and cosines, motion of bodies, equivalents of heat, properties of light, evaporating powers, differences of fuel, varnishes, alloys, or the efficacy of steam-engines. The laws it presents are not empirical, but are positive solutions derived from the most reliable sources."—*New York Times*.

"It is the *vade-mecum* of the practical scientist, and might with reason be assigned a place in all libraries of reference. It has just been advanced to its fifty-seventh edition, which is an entire revision of preceding issues. Is complete in every detail, and thoroughly reliable."—*Brooklyn Times*.

HAND REAMERS.*

The Hand or Solid Reamers, shown in Fig. 517, are so well known that any further description is unnecessary. They are of the Morse Twist Drill and Machine Co.'s make.

Diameter. In inches.	Price. Each.	Full Length. In inches.	Length of Flute. In inches.
$\frac{1}{8}$	\$0.90	3	$1\frac{1}{8}$
$\frac{1}{4}$	1.00	$3\frac{1}{2}$	$1\frac{1}{2}$
$\frac{3}{8}$	1.10	$3\frac{1}{2}$	$1\frac{1}{2}$
$\frac{1}{2}$	1.15	$3\frac{1}{2}$	$1\frac{1}{2}$
$\frac{5}{8}$	1.25	4	2
$\frac{3}{4}$	1.30	$4\frac{1}{2}$	$2\frac{1}{2}$
$\frac{7}{8}$	1.35	$4\frac{1}{2}$	$2\frac{1}{2}$
1	1.40	$4\frac{1}{2}$	$2\frac{1}{2}$
$1\frac{1}{8}$	1.45	5	$2\frac{1}{2}$
$1\frac{1}{4}$	1.55	$5\frac{1}{2}$	$2\frac{1}{2}$
$1\frac{3}{8}$	1.60	$5\frac{1}{2}$	$2\frac{1}{2}$
$1\frac{1}{2}$	1.65	$5\frac{1}{2}$	$2\frac{1}{2}$
$1\frac{3}{4}$	1.70	6	3
$1\frac{7}{8}$	1.75	$6\frac{1}{2}$	$3\frac{1}{2}$
2	1.80	$6\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{8}$	1.90	$6\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{4}$	2.00	7	$3\frac{1}{2}$
$2\frac{3}{8}$	2.05	$7\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{2}$	2.15	$7\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{8}$	2.25	8	$4\frac{1}{2}$
$2\frac{3}{4}$	2.35	$8\frac{1}{2}$	$4\frac{1}{2}$
$2\frac{1}{2}$	2.40	$8\frac{1}{2}$	$4\frac{1}{2}$
$2\frac{7}{8}$	2.50	$9\frac{1}{2}$	$4\frac{1}{2}$
$2\frac{3}{4}$	2.65	9	$4\frac{1}{2}$
$2\frac{1}{2}$	2.80	$9\frac{1}{2}$	$4\frac{1}{2}$
$2\frac{7}{8}$	2.95	$10\frac{1}{2}$	$5\frac{1}{2}$
$2\frac{3}{4}$	3.05	$10\frac{1}{2}$	5
$2\frac{1}{2}$	3.20	$10\frac{1}{2}$	$5\frac{1}{2}$
3	3.30	$10\frac{1}{2}$	$5\frac{1}{2}$
$3\frac{1}{8}$	3.60	$11\frac{1}{2}$	5
$3\frac{1}{4}$	3.85	$11\frac{1}{2}$	$5\frac{1}{2}$
$3\frac{3}{8}$	4.15	12	6
$3\frac{1}{2}$	4.40	$12\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{3}{4}$	4.70	$12\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{1}{2}$	5.05	12	$6\frac{1}{2}$
$3\frac{7}{8}$	5.40	$12\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{1}{2}$	5.75	13	$6\frac{1}{2}$
$3\frac{7}{8}$	6.10	13	$6\frac{1}{2}$
$3\frac{1}{2}$	6.50	13	$6\frac{1}{2}$
$3\frac{7}{8}$	6.85	$13\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{1}{2}$	7.20	$13\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{7}{8}$	7.55	$13\frac{1}{2}$	$6\frac{1}{2}$
$3\frac{1}{2}$	7.90	14	7
$3\frac{7}{8}$	8.30	14	7
4	8.65	14	7

* When Reamers are to be used for brass, please so advise us, as it is necessary to give them more clearance than those used for iron or steel.

The Hand Reamers are furnished in sets varying by 16ths, of an inch, as follows:

$\frac{1}{2}$ to 1 inch,	\$27.00
$\frac{1}{4}$ " $1\frac{1}{2}$ "	43.20
$\frac{1}{4}$ " $1\frac{1}{2}$ "	63.00
$\frac{1}{2}$ " 2 "	121.50

Varying by 32nds of an inch, as follows:

$\frac{1}{2}$ to 1 inch,	\$51.75
$\frac{1}{4}$ " $1\frac{1}{2}$ "	83.00
$\frac{1}{4}$ " $1\frac{1}{2}$ "	123.25
$\frac{1}{2}$ " 2 "	238.50

The Three-Groove Chucking Reamer (Fig. 518) is a comparatively new tool on the market, although this style of reamer has been used for a great number of years by many of the large Eastern tool-makers. They are especially useful for reaming cored or roughly bored holes. First cost is somewhat greater but they are much more economical to use than either the Rose Chucking or Fluted Reamers, on account of their strength and wearing quality. Are furnished with Taper or Straight Shanks, and $\frac{1}{4}$ of an inch under size, unless otherwise ordered. Special sizes and lengths made to order.



FIG. 517.



FIG. 518.

Diam. in Inches.	Price. Each.	Full Length. In inches.	Length of Flute. In inches.	
$\frac{1}{8}$	\$2.35	13	9	No. 2.
$\frac{1}{4}$	2.45	13	9	
$\frac{3}{8}$	2.60	13	9	
$\frac{1}{2}$	2.70	13	9	
$\frac{5}{8}$	2.85	13	9	No. 3.
$\frac{3}{4}$	3.05	13	9	
1	3.25	13	9	
$1\frac{1}{8}$	3.40	13	9	
$1\frac{1}{4}$	3.60	13	9	No. 4.
$1\frac{3}{8}$	4.05	16	$10\frac{1}{2}$	
$1\frac{1}{2}$	4.30	16	$10\frac{1}{2}$	
$1\frac{3}{4}$	4.70	16	$10\frac{1}{2}$	
$1\frac{7}{8}$	5.05	16	$10\frac{1}{2}$	No. 5.
2	5.40	16	$10\frac{1}{2}$	
$2\frac{1}{8}$	5.80	16	$10\frac{1}{2}$	
$2\frac{1}{4}$	6.65	16	$10\frac{1}{2}$	
$2\frac{3}{8}$	7.55	16	10	No. 6.
$2\frac{1}{2}$	8.30	16	10	
$2\frac{7}{8}$	8.80	16	10	

ROSE CHUCKING REAMER. FIG. 519.



FIG. 519.

Diameter, Inches.	Price, Each.	Length, Inches.
$\frac{1}{2}$	\$0.70	6
$\frac{3}{8}$	.80	6
$\frac{1}{2}$	.90	7
$\frac{3}{4}$	1.00	7
$\frac{7}{8}$	1.10	8
$1\frac{1}{8}$	1.15	8
$1\frac{1}{4}$	1.25	9
$1\frac{3}{8}$	1.35	9
$1\frac{1}{2}$	1.45	9 $\frac{1}{2}$
$1\frac{3}{4}$	1.55	9 $\frac{1}{2}$
$1\frac{7}{8}$	1.60	10
2	1.75	10
$2\frac{1}{8}$	1.90	10 $\frac{1}{2}$
$2\frac{1}{4}$	2.00	10 $\frac{1}{2}$
$2\frac{3}{8}$	2.15	11
$2\frac{1}{2}$	2.30	11
$2\frac{7}{8}$	2.45	11 $\frac{1}{2}$
3	2.55	11 $\frac{1}{2}$
$3\frac{1}{8}$	2.70	12
$3\frac{1}{4}$	2.85	12
$3\frac{3}{8}$	3.00	12 $\frac{1}{2}$
$3\frac{1}{2}$	3.10	12 $\frac{1}{2}$
$3\frac{3}{4}$	3.25	13
$3\frac{7}{8}$	3.35	13
4	3.50	13 $\frac{1}{2}$
$4\frac{1}{8}$	3.65	13 $\frac{1}{2}$
$4\frac{1}{4}$	3.80	14
$4\frac{3}{8}$	4.00	14
$4\frac{1}{2}$	4.15	14

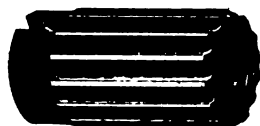


FIG. 520. "FLUTED" SHELL REAMER.



FIG. 521. "ROSE" SHELL REAMER.

PRICE LIST FOR

ROSE AND FLUTED SHELL REAMERS.

Diameter, Inches.	Price, Each.	Length, Inches.
$\frac{1}{2}$	\$1.00	1 $\frac{1}{2}$
$\frac{3}{8}$	1.00	1 $\frac{1}{2}$
$\frac{1}{2}$	1.10	1 $\frac{1}{2}$
$\frac{3}{4}$	1.15	1 $\frac{1}{2}$
$\frac{7}{8}$	1.25	2

Diam., In.	Each.	Length, In.
$\frac{1}{2}$	\$1.35	2
$\frac{3}{8}$	1.45	2 $\frac{1}{2}$
$\frac{1}{2}$	1.45	2 $\frac{1}{2}$
$\frac{3}{4}$	1.45	2 $\frac{1}{2}$
$\frac{7}{8}$	1.45	2 $\frac{1}{2}$
1	1.55	2 $\frac{1}{2}$
$1\frac{1}{8}$	1.55	2 $\frac{1}{2}$
$1\frac{1}{4}$	1.60	2 $\frac{1}{2}$
$1\frac{3}{8}$	1.60	2 $\frac{1}{2}$
$1\frac{1}{2}$	1.70	2 $\frac{1}{2}$
$1\frac{3}{4}$	1.80	2 $\frac{1}{2}$
$1\frac{7}{8}$	2.00	2 $\frac{1}{2}$
2	2.15	3
$2\frac{1}{8}$	2.35	3
$2\frac{1}{4}$	2.50	3
$2\frac{3}{8}$	2.70	3
$2\frac{1}{2}$	2.90	3
$2\frac{7}{8}$	3.15	3
3	3.40	3 $\frac{1}{2}$
$3\frac{1}{8}$	3.70	3 $\frac{1}{2}$
$3\frac{1}{4}$	3.95	3 $\frac{1}{2}$
$3\frac{3}{8}$	4.25	3 $\frac{1}{2}$
$3\frac{1}{2}$	4.50	3 $\frac{1}{2}$
$3\frac{3}{4}$	4.70	3 $\frac{1}{2}$
$3\frac{7}{8}$	4.85	3 $\frac{1}{2}$
4	5.05	3 $\frac{1}{2}$
$4\frac{1}{8}$	5.20	3 $\frac{1}{2}$
$4\frac{1}{4}$	5.40	3 $\frac{1}{2}$
$4\frac{3}{8}$	5.75	3 $\frac{1}{2}$
$4\frac{1}{2}$	6.10	3 $\frac{1}{2}$
$4\frac{3}{4}$	6.60	4
$4\frac{7}{8}$	7.20	4
5	7.90	4
$5\frac{1}{8}$	8.65	4
$5\frac{1}{4}$	9.20	4 $\frac{1}{2}$
$5\frac{3}{8}$	9.90	4 $\frac{1}{2}$
$5\frac{1}{2}$	10.80	4 $\frac{1}{2}$
$5\frac{3}{4}$	11.70	4 $\frac{1}{2}$
$5\frac{7}{8}$	12.60	5
6	13.50	5
$6\frac{1}{8}$	14.40	5
$6\frac{1}{4}$	16.20	5

SHELL REAMER ARBORS. FIG. 522.

No.	Price, Each.	Fitting Reamers.	Length, Inches.
1	\$1.10	$\frac{1}{2}$ to $\frac{1}{2}$	6
2	1.25	$\frac{3}{8}$ " $\frac{1}{2}$	7
3	1.45	$\frac{1}{2}$ " $\frac{1}{2}$	8
4	1.60	$\frac{3}{4}$ " $\frac{1}{2}$	9
5	1.80	$\frac{7}{8}$ " $\frac{1}{2}$	9 $\frac{1}{2}$
6	2.00	1 " $\frac{1}{2}$	10
7	2.15	1 $\frac{1}{8}$ " $\frac{1}{2}$	11
8	2.45	1 $\frac{1}{4}$ " $\frac{1}{2}$	12
9	2.70	2 " $\frac{1}{2}$	13
10	3.05	2 $\frac{1}{2}$ " $\frac{1}{2}$	14
11	4.50	3 " $\frac{1}{2}$	15
12	6.30	3 $\frac{1}{2}$ " $\frac{1}{2}$	16



FIG. 522.

ADJUSTABLE REAMERS.

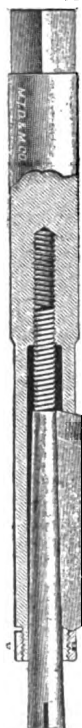


FIG. 523.

The Adjustable Reamer, Fig. 523, will be found a serviceable and, indeed, a necessary tool where sizes have to be kept up very closely, as they can be readily adjusted to compensate for wear.

We do not advocate their sale or use, except where parties have a suitable machine for grinding them, as it is an extremely difficult matter to adjust the cutting blades, so that they will all bear an even portion of the work.

There are at least a dozen different varieties of Adjustable Reamers, many of them quite similar. Have used a number of different kinds, and consider the Morse (Fig. 523) as good as any.

The construction of the Reamer is shown by the accompanying cut. A ground tapered plug, acting upon the chasers, adjusts the Reamer to the size desired.

To operate the plug, the head nut *A* should be loosened; and the plug then turned until the size desired is obtained. The head nut should then be tightened.

Diam.	Each.	Length.	Diam.	Each.	Length.
$\frac{1}{8}$	\$4.15	9	$\frac{1}{16}$	\$7.40	19 $\frac{1}{2}$
$\frac{1}{4}$	4.50	10 $\frac{1}{2}$	$\frac{1}{8}$	7.75	12 $\frac{1}{2}$
$\frac{3}{8}$	4.80	10 $\frac{1}{2}$	$\frac{3}{16}$	8.10	12 $\frac{1}{2}$
$\frac{1}{2}$	5.05	10 $\frac{1}{2}$	$\frac{1}{4}$	8.40	12 $\frac{1}{2}$
$\frac{5}{8}$	5.30	10 $\frac{1}{2}$	$\frac{5}{16}$	8.65	12 $\frac{1}{2}$
$\frac{3}{4}$	5.60	11 $\frac{1}{2}$	$\frac{3}{8}$	8.80	12 $\frac{1}{2}$
$\frac{7}{8}$	5.85	11 $\frac{1}{2}$	$\frac{7}{16}$	9.20	13 $\frac{1}{2}$
1	6.10	11 $\frac{1}{2}$	$\frac{1}{2}$	9.40	13 $\frac{1}{2}$
$1\frac{1}{8}$	6.40	11 $\frac{1}{2}$	$\frac{9}{16}$	9.55	13 $\frac{1}{2}$
$1\frac{1}{4}$	6.65	11 $\frac{1}{2}$	2	9.75	13 $\frac{1}{2}$
$1\frac{3}{4}$	7.00	11 $\frac{1}{2}$			

TORN CATALOGUES.—Every article in this catalogue is very plainly described, either by Figure number, regular number, or name; and we beg of our customers not to cut nor tear out parts of these, as this mutilates the book, and when done to any extent destroys it for reference.



FIG. 524.

Fig. 524 illustrates a Reamer commonly known as the Morse Taper Reamer, it is used principally for reaming holes to receive Twist Drills, as the shanks of all makes of taper shank drills are made to suit this taper.

Reamer	Each.
No. 1.	\$1.80
" 2	2.45
" 3	3.05
" 4	3.80
" 5	5.95
" 6	10.80

	Diam. of Small End.	Diam. of Large End.
No. 1.	.365	.5415
" 2	.572	.707
" 3	.775	1.025
" 4	1.021	1.303
" 5	1.480	1.786
" 6	2.129	2.597

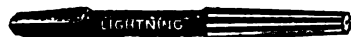


FIG. 525. LIGHTNING BRACE REAMER.

These Reamers are intended to make true, smooth holes when the punching or drilling is not quite perfect.

The sizes are arranged to follow each other from the smallest to the largest, so that with a set of these, any size from $\frac{1}{8}$ to $1\frac{1}{2}$ inch may be accurately made. Each Reamer leaves a round, true-cut hole. They will also be found useful for hard wood as well as iron.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Each,	\$0.30	.34	.37	.40	.47	.54	.60

Set of five sizes, $\frac{1}{8}$ to $\frac{1}{2}$ inch, in a neat hardwood case, \$2.40; set of nine sizes, $\frac{1}{8}$ to $1\frac{1}{2}$ inch, in hardwood case, \$5.80.



FIG. 526.

The Lightning Machine Reamers, Fig. 526, have the same taper as those shown in Fig. 525, but the shanks are round and are $\frac{1}{8}$ inch in diameter.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Each,	\$0.55	.60	.65	.70	.75	.85	1.00

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Each,	\$1.20	1.40	1.60	1.80	2.00	2.25	

TAPS

The following interesting article is taken from the *Iron Age*:

"The time is not so far behind us but that it may be within the recollection of a middle-aged* machinist when these tools were of such crude and imperfect character, as to appear veritable monstrosities as compared with those of modern make.

A tap was usually a steel screw, whose thread was of almost any angle except the correct one; while the size varied from the standard to a corresponding degree. The method most commonly used for making the teeth was to file the tap square. Some mechanics, more than ordinarily particular, would file a shallow groove with the corner of a square file. Clearance was a thing unknown, and, in consequence, to use these tools was veritably to earn one's bread by the sweat of his brow.

The standard taps and dies made by any one of the numerous concerns engaged in the manufacture of this class of specialties, are correct in all essential features of construction; and by their use, the cutting of threads may be accomplished with a minimum of power—only so much being required as is actually necessary to do the cutting—without a useless expenditure to overcome a frictional resistance, possibly double that actually applied to the cutting. From the fact, that as an article of manufacture, the various operations necessary in their construction may be done by the use of the most improved special machinery, these tools can be produced and sold at a profit, at a price far below the actual cost of making them in the tool room, where the possible facilities are necessarily far inferior. As a rule, therefore, it does not pay for even the best equipped shops to make standard sizes and threads."

Hob, Pulley, Stay Bolt, Patch Bolt, and Brass Pipe sizes, which were formerly considered special, are now made and kept in stock regularly.

Our facilities for furnishing promptly, and at reasonable prices, special taps of all shapes, sizes and threads, are excellent, and we will be pleased to receive orders or inquiries in this direction.

* Wouldn't a young machinist do as well?



FIG. 527. V THREAD. FIG. 528. U. S. ST'D.

With the V style of thread, Fig. 527, the table below, has, by common consent, become the standard. Other numbers of threads to the inch are made and kept in stock. When exact duplicates of special work are wanted, orders should be accompanied by a stub, with nut fitting same.

The shape of thread, Fig. 528, is called either Sellers', Franklin Institute, or United States Standard; was recommended by the Franklin Institute of Philadelphia, and has been adopted by the United States Government, and some of the leading Mechanical Associations of the country. It is fast coming into general use by leading manufacturers as the standard for screw threads.

Diam. of Tap.	V THREADS.		U. S. ST'D THREADS	
	Threads per Inch.	Diam. at Root.	Threads per Inch.	Diam. at Root.
$\frac{1}{8}$	20	.163	20	.185
$\frac{1}{4}$	18	.217	18	.240
$\frac{3}{8}$	16	.267	16	.294
$\frac{1}{2}$	14	.314	14	.344
$\frac{5}{8}$	12	.365	12	.400
$\frac{3}{4}$	12	.419	12	.454
$\frac{7}{8}$	11	.468	11	.507
1	10	.577	10	.620
$1\frac{1}{8}$	9	.683	9	.731
$1\frac{1}{4}$	8	.783	8	.837
$1\frac{3}{8}$	7	.878	7	.940
$1\frac{1}{2}$	7	1.003	7	1.065
$1\frac{3}{4}$	6	1.086	6	1.160
$1\frac{7}{8}$	6	1.211	6	1.284
2	5	1.279	$5\frac{1}{2}$	1.389
$2\frac{1}{8}$	5	1.404	5	1.491
$2\frac{1}{4}$	$4\frac{1}{2}$	1.491	5	1.616
$2\frac{3}{8}$	$4\frac{1}{2}$	1.616	$4\frac{1}{2}$	1.719
$2\frac{1}{2}$	4	1.817	$4\frac{1}{2}$	1.962
$2\frac{7}{8}$	4	2.067	4	2.176



FIG. 529. WHITWORTH.

Fig 529, Whitworth Standard, is furnished with same number of threads as V Standard, given in table above.

COMPLETE BOOKLET on Screw cutting in the lathe, giving Problems, Rules, etc., sent to any address for 25 cents.

HAND TAPS.

Our stock of Taps is of the J. M. Carpenter Tap & Die Co.'s make. We think this firm excels in the quality of their productions.

Hand and Machine Taps are usually made from two to five one-thousandths of an inch over size, thus allowing a trifle for wear. In measuring a lot of taps in sizes from one-quarter to one inch, we do not find a variation of two one-thousandths of an inch in any taps of same marked size.



FIG. 530.
TAPER
TAP.



FIG. 531.
PLUG
TAP.



FIG. 532.
BOTTOMING
TAP.

KEEP ALL TAPS SHARP.—Many persons using taps overlook the fact that when Taps become dull they work hard and should be sharpened the same as any other metal-cutting tools. Tools of this class that are properly made may be sharpened by grinding in the flutes, without changing their shape or diameters.

Hand Taps are kept in stock with both V and U. S. Standard shape of threads. All orders for U. S. Standard Taps will be filled with sizes and number of threads to the inch, as given in table on page 138.

Sizes larger than two inches are made only to order, and prices will be named upon application.

For sizes of Tap Drills, see page 143.

For postage on Taps, see page 143.

In the following list it will be noticed that we print quite a variety of threads in the various sizes.

We would urge our customers to use, as far as possible, taps with standard threads. These will be distinguished in this list by being printed in bold-face type, and will also be found on page 137.

It is of very common occurrence for us to receive orders for Set and Cap Screws with special threads, caused by the using of an odd tap. These special screws, or parts of any kind, have to be made to order, and are necessarily much more expensive than regular stock sizes, and the delay in obtaining them is annoying and costly.

Diam. Inch.	Price Each.	Whole Length. In inches.	Number of Threads to the inch.			
$\frac{1}{8}$	\$0.30	$2\frac{1}{2}$	18	20	22	24
$\frac{1}{4}$	0.34	3	16	18	20	24
$\frac{3}{8}$	0.37	$3\frac{1}{2}$	14	16	18	
$\frac{1}{2}$	0.40	$3\frac{1}{2}$	12	14	16	
$\frac{5}{8}$	0.47	$3\frac{1}{2}$	12	13	14	
$\frac{3}{4}$	0.54	4	12	14		
$\frac{7}{8}$	0.60	$4\frac{1}{2}$	10	11	12	
1	0.70	$4\frac{1}{2}$	10	11	12	
$1\frac{1}{8}$	0.80	$4\frac{1}{2}$	10	12		
$1\frac{1}{4}$	0.93	5	10			
$1\frac{1}{2}$	1.07	$5\frac{1}{2}$	9	10	12	
$1\frac{3}{4}$	1.20	$5\frac{1}{2}$	9			
2	1.34	$5\frac{1}{2}$	8			
$2\frac{1}{4}$	1.50	6	7	8		
$2\frac{1}{2}$	1.74	$6\frac{1}{2}$	7			
$2\frac{3}{4}$	2.00	$6\frac{1}{2}$	6			
3	2.34	$6\frac{1}{2}$	6			
$3\frac{1}{4}$	2.80	7	5			
$3\frac{1}{2}$	3.34	$7\frac{1}{2}$	5			
$3\frac{3}{4}$	3.87	$7\frac{1}{2}$	$4\frac{1}{2}$			
4	4.47	$7\frac{1}{2}$	$4\frac{1}{2}$			
$2\frac{1}{8}$ *		8	$4\frac{1}{2}$			
$2\frac{1}{4}$ *		$8\frac{1}{2}$	$4\frac{1}{2}$			
$2\frac{3}{8}$ *		$8\frac{1}{2}$	4			
$2\frac{1}{2}$ *		$9\frac{1}{2}$	4			
3 *		$9\frac{1}{2}$	$3\frac{1}{2}$			
$3\frac{1}{4}$ *		10	$3\frac{1}{2}$			
$3\frac{1}{2}$ *		$10\frac{1}{2}$	$3\frac{1}{2}$			
$3\frac{3}{4}$ *		$10\frac{1}{2}$	3			
4 *		$10\frac{1}{2}$	3			

Hand Taps with V Threads are kept in stock, $\frac{1}{8}$ inch oversize, from $\frac{1}{8}$ to $\frac{1}{2}$ inch inclusive; and $\frac{1}{4}$ inch oversize, from $\frac{1}{2}$ to $1\frac{1}{2}$ inch inclusive. Prices same as above.

All sizes, lengths and threads not mentioned above, will be classed as special goods and subject to special price.

* Prices upon application.

FIG. 535. LIGHTNING PLATE TAP.

Above is the style of tap usually furnished with the Lightning, Little Giant, and other sets of dies. It is really a Hand Nut Tap, and is almost invariably sold $\frac{1}{2}$ of an inch oversize. We carry them in stock from $\frac{1}{4}$ to 1 inch. Prices same as Hand Taps on opposite page.

MACHINE, OR NUT TAPS. FIG. 534.

Sizes larger than 2 inch of either V or U. S. Standard form of thread are made only to order. Taps of all sizes, with Whitworth form of thread, furnished at same prices.

All taps and dies are furnished exact size, unless oversize is specified on order.

Diam. Inch.	Price. Each.	Threads to inch.	L'gth. of T'd. Inches.	Whole L'gth. Inches.
$\frac{1}{4}$	\$0.40	18 20	1 $\frac{1}{2}$	5
$\frac{1}{8}$	0.47	16 18	2	5 $\frac{1}{2}$
$\frac{3}{16}$	0.54	14 16	2 $\frac{1}{2}$	6 $\frac{1}{2}$
$\frac{1}{2}$	0.60	14	2 $\frac{1}{2}$	7 $\frac{1}{2}$
$\frac{5}{8}$	0.67	12 13	2 $\frac{1}{2}$	8
$\frac{3}{4}$	0.77	12	3	8 $\frac{1}{2}$
$\frac{7}{8}$	0.87	10 11	3 $\frac{1}{2}$	9 $\frac{1}{2}$
1	0.97	11	3 $\frac{1}{2}$	10 $\frac{1}{2}$
1 $\frac{1}{4}$	1.07	10	3 $\frac{1}{2}$	10 $\frac{1}{2}$
1 $\frac{1}{2}$	1.20	10	4 $\frac{1}{2}$	11
1 $\frac{3}{4}$	1.40	9	4 $\frac{1}{2}$	11
2	1.60	9	4 $\frac{1}{2}$	11 $\frac{1}{2}$
2 $\frac{1}{4}$	1.85	8	4 $\frac{1}{2}$	11 $\frac{1}{2}$
2 $\frac{1}{2}$	2.13	7	5 $\frac{1}{2}$	12 $\frac{1}{2}$
2 $\frac{3}{4}$	2.45	7	5 $\frac{1}{2}$	13 $\frac{1}{2}$
3	2.80	6	6 $\frac{1}{2}$	14
3 $\frac{1}{4}$	3.15	6	6 $\frac{1}{2}$	14 $\frac{1}{2}$
3 $\frac{1}{2}$	3.55	5	7 $\frac{1}{2}$	15 $\frac{1}{2}$
3 $\frac{3}{4}$	4.00	5	7 $\frac{1}{2}$	16 $\frac{1}{2}$
4	4.55	4 $\frac{1}{2}$	8 $\frac{1}{2}$	17
4 $\frac{1}{4}$	5.15	4 $\frac{1}{2}$	8 $\frac{1}{2}$	17 $\frac{1}{2}$
2 $\frac{1}{2}$ *		4 $\frac{1}{2}$	9	18
2 $\frac{3}{4}$ *		4 $\frac{1}{2}$	9	18 $\frac{1}{2}$
3 *		4	9 $\frac{1}{2}$	18 $\frac{1}{2}$
3 $\frac{1}{4}$ *		4	9 $\frac{1}{2}$	19 $\frac{1}{2}$
3 $\frac{1}{2}$ *		3 $\frac{1}{2}$	9 $\frac{1}{2}$	19 $\frac{1}{2}$
3 $\frac{3}{4}$ *		3 $\frac{1}{2}$	10	20
4 *		3 $\frac{1}{2}$	10	20 $\frac{1}{2}$
4 $\frac{1}{4}$ *		3	10 $\frac{1}{2}$	20 $\frac{1}{2}$
4 $\frac{1}{2}$ *		3	10 $\frac{1}{2}$	20 $\frac{1}{2}$

FIG. 534. Postage on Taps, see page 143.

*Prices upon application.

FIG. 535. TAPPER TAP.

Diam.	L'gth. 11 in.	L'gth. 14 in.	No. of Threads.	L'gth of Thread.
$\frac{1}{4}$ in.	\$0.47	\$0.56	18 20	1 $\frac{1}{2}$ in.
$\frac{1}{8}$ "	0.54	0.63	16 18	2 "
$\frac{3}{16}$ "	0.60	0.70	14 16	2 "
$\frac{1}{2}$ "	0.70	0.80	14	2 $\frac{1}{2}$ "
$\frac{5}{8}$ "	0.77	0.88	13	2 $\frac{1}{2}$ "
$\frac{3}{4}$ "	0.87	1.03	12	2 $\frac{1}{2}$ "
$\frac{7}{8}$ "	1.00	1.15	11	2 $\frac{1}{2}$ "
1 "	1.20	1.40	10	2 $\frac{1}{2}$ "
1 $\frac{1}{4}$ "	1.55	1.82	9	3 "
1 $\frac{1}{2}$ "	2.10	2.45	8	3 $\frac{1}{2}$ "

All orders for Hand, Nut, Tapper, Long and Short Hob, and Pulley Taps, will be filled with V threads, unless otherwise mentioned on the order; also with standard number of threads to the inch, as given in table on page 137.

All orders for U. S. Standard Thread Taps and Dies will be filled with standard number of threads to the inch, as found in table on page 137.

Diam. Inches.	Solid Die Hoba.	Open Die Hoba.
$\frac{1}{4}$	\$0.65	\$0.48
$\frac{1}{8}$	0.75	0.54
$\frac{3}{16}$	0.85	0.60
$\frac{1}{2}$	0.95	0.65
$\frac{5}{8}$	1.05	0.75
$\frac{3}{4}$	1.25	0.85
$\frac{7}{8}$	1.40	0.95
1	1.70	1.25
1 $\frac{1}{4}$	2.20	1.70
1 $\frac{1}{2}$	3.00	2.15
1 $\frac{3}{4}$	3.40	2.40
2	3.90	2.55
2 $\frac{1}{4}$	4.45	3.20
2 $\frac{1}{2}$	5.00	3.75
2 $\frac{3}{4}$	5.60	4.50
3	6.40	5.30
SOLID 1 $\frac{1}{2}$	7.25	6.15
DIE HOB. 2	8.15	7.15

FIG. 536 represents a style of tap used principally for cutting solid dies. Open dies can also be cut with it. FIG. 537 is the style of tap intended for open and screw-plate dies. In ordering Hob Taps, please specify fully for what purpose they are intended.



FIG. 538. PULLEY TAP.



FIG. 539. STAY BOLT TAP.

A Pulley Tap is similar in style to a Plug Hand Tap, with long shank. They are kept in stock, standard size, with V threads as given in list below, and with U. S. Standard threads (see page 139). Other diameters, threads and lengths, furnished when desired.

PRICES OF PULLEY TAPS.

Diam.	Threads to inch.	Length in inches.				
		6	8	10	12	16
$\frac{1}{2}$ in.	16	\$0.55	.65	.80		
$\frac{3}{4}$ "	14	.65	.75	.85		
$\frac{1}{2}$ "	12-13		.80	.90	1.00	
$\frac{3}{4}$ "	11		.95	1.05	1.15	1.35
$\frac{1}{2}$ "	10				1.30	1.50
$\frac{3}{4}$ "	9				1.60	1.90

STAY BOLT TAPS.

These vary so much in dimensions that they are made to order only. We can fill orders in a few days. In ordering, state diameter, number of threads per inch, also lengths of the parts at A, B, C, D and E (see Fig. 539).

All orders for Stay Bolt Taps will be filled with taps cutting twelve threads to the inch, unless otherwise specified.

Diameter.

Length.	$\frac{1}{2}$ in. ± 1	$\frac{3}{4}$ in. ± 1	1 in. ± 1	1 1/2 in. ± 1
16 in.	\$4.50	\$5.30	\$6.10	\$7.20
18 "	5.75	6.80	7.60	8.40
21 "	6.40	7.50	8.30	9.60
24 "	7.05	8.15	8.95	10.20
27 "	8.70	9.80	10.60	11.80
30 "	10.40	11.40	12.20	13.20
33 "	11.20	12.30	13.10	14.40
36 "	12.00	13.20	14.00	15.60
39 "	13.20	14.50	16.00	17.60
42 "	14.40	15.80	17.60	19.20

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FIG. 540. PATCH BOLT TAP.

These are made especially for Boiler-makers. Are short, strong and slightly tapered, for the purpose of making a steam-tight fit. All Patch Bolt Taps carried in stock have 12 threads to the inch.

Diam.	Each.	Diam.	Each.
$\frac{1}{2}$ inch.	\$0.50	$\frac{3}{4}$ inch.	\$1.00
$\frac{1}{2}$ "	.65	$\frac{1}{2}$ "	1.10
$\frac{3}{4}$ "	.75	$\frac{3}{4}$ "	1.25
$\frac{1}{2}$ "	.85	1 "	1.40



FIG. 541. STOVE BOLT TAP.

Diam.	Per doz.	Each.	Threads to inch.
$\frac{1}{2}$ inch.	\$2.00	\$0.20	28
$\frac{3}{4}$ "	2.00	.20	24
$\frac{1}{2}$ "	2.00	.20	24
$\frac{3}{4}$ "	2.20	.23	18
$\frac{1}{2}$ "	2.20	.23	18
$\frac{3}{4}$ "	2.65	.27	16

Lists of Stove and Patch Bolts, carried in stock, found elsewhere in this book.



FIG. 542. BIT BRACE TAP.

Diam.	Each.	Threads.	Diam.	Each.	Threads.
$\frac{1}{2}$ in.	\$0.40	24,	$\frac{3}{4}$ in.	\$0.50	14, 16,
$\frac{1}{2}$ "	.40	18, 20,	$\frac{1}{2}$ "	.55	12, 14,
$\frac{3}{4}$ "	.45	16, 18,	$\frac{1}{2}$ "	.65	12, 13.

Bit Brace Taps are always sent $\frac{1}{2}$ of an inch over-size unless otherwise specified.

Nearly all small and medium size taps may be sent by mail at small expense.

For postage on Taps and Dies, see pages 143 and 144.

MACHINE SCREW TAPS.



FIG. 543.

To avoid annoyance and misunderstandings, which are constantly occurring, we wish to state here, that Standard Machine Screws are not made in fractional sizes, as regards diameter. They are made to the Standard Screw Gauge, which is as arbitrary as the Standard Wire Gauge. Thus, when $\frac{1}{4}$ inch are ordered, we send No. 14—20 threads to the inch, and when $\frac{1}{8}$ inch, we send No. 20—16 threads to the inch. Neither of these screws fit Standard Taps, as the No. 14 is a trifle

smaller than $\frac{1}{4}$ inch, and the No. 20 is not only larger than $\frac{1}{8}$ inch, but has 16 threads to the inch, while the regular standard is 18 threads. Those who use these screws will find it a great deal cheaper in the end to buy Standard Machine Screw Taps, as they can always order screws by the number marked on the tap, and be sure of getting them the right diameter and thread, and get them *at once*. The odd sizes, (those differing from the standard) in the list, are used generally for repair work and special purposes.

Iron or Brass Machine Screws, with flat, round or fillister heads, kept in stock to match sizes shown in bold faced type.

No.	Standard Threads.	Per Dozen.	Each.	Diameter about	Size of Drill to drill hole for Tapping.	No.	We also carry Taps of following Threads.
2	56	\$2.00	\$0.30	$\frac{1}{16}$	Scant	No. 48	48, 64,
3	48	2.00	.29	$\frac{1}{8}$	Scant	" 47	40, 56,
4	36	2.00	.30	$\frac{1}{4}$	Full	" 44	32, 40,
5	36	2.00	.30	$\frac{1}{2}$	Full	" 41	30, 32, 40
6	32	2.00	.30	$\frac{3}{8}$	"	" 37	30, 36, 40
7	32	2.00	.30	$\frac{1}{2}$	"	" 33	28, 30,
8	32	2.00	.30	$\frac{3}{4}$	"	" 30	24, 30,
9	30	2.00	.30	$\frac{1}{2}$	Scant.	" 26	24, 28, 32
10	24	2.00	.30	$\frac{1}{2}$	Full	" 26	28, 30, 32
11	24	2.00	.30	$\frac{3}{4}$	"	" 21	28, 30,
12	24	2.00	.30	$\frac{1}{2}$	"	" 19	20, 22,
13	22	2.20	.32	$\frac{3}{4}$	"	" 17	20, 24,
14	20	2.20	.32	$\frac{1}{2}$	Scant.	" 18	22, 24,
15	20	2.20	.32	$\frac{3}{4}$	Full	" 10	18, 22, 24
16	18	2.20	.32	$\frac{1}{2}$	"	" 6	16, 20, 24
17	18	2.20	.32	$\frac{1}{2}$	"	" 4	16, 20,
18	18	2.20	.32	$\frac{3}{4}$	"	" 2	16, 20,
19	18	2.20	.32	$\frac{1}{2}$	Letter B	"	16, 20,
20	16	2.65	.38	$\frac{3}{4}$	Full	" B	18, 20,
23	16	2.65	.38	$\frac{1}{2}$	"	" H	18,
24	16	2.65	.38	$\frac{1}{2}$	"	" L	14, 18,
26	16	3.15	.35	$\frac{1}{2}$	"	" P	14,
28	14	3.15	.35	$\frac{1}{2}$	"	" R	16,
30	14	3.15	.35	$\frac{1}{2}$	"	" U	16,



FIG. 544. SMALL FRACTIONAL SIZE TAPS.

The accompanying table covers a line of taps in fractional sizes under $\frac{1}{4}$ inch. Dies suitable for these taps will be found on page 144. There is no regular standard of threads for these sizes, but we print in bold-faced type the threads most commonly used.

Other sizes furnished to order. Send 2 cents extra for postage.

Diameter,	Price.	Number of Threads.
$\frac{1}{16}$	\$.30	72
$\frac{1}{8}$	.30	60
$\frac{1}{4}$	.30	48, 56
$\frac{3}{8}$	.30	40, 44
$\frac{1}{2}$	.30	36, 40
$\frac{3}{4}$	.30	36, 40
$\frac{1}{2}$	.30	32, 36
$\frac{3}{4}$	.30	32, 36
$\frac{1}{2}$	.30	24, 32
$\frac{3}{4}$	.30	24, 28
$\frac{1}{2}$	.30	24, 30
$\frac{3}{4}$	.30	24, 28



FIG. 545.

In Blacksmiths' Taper Taps, Fig. 545, we carry in stock those made by J. M. King & Co. Other Tap manufacturers make neater looking, more finely finished and perhaps, more accurately cut Taps, but our blacksmith customers seem to invariably prefer the King Tap.

LEFT HAND TAPS.

We carry in stock quite an assortment of Taps of Standard Sizes with Left Hand Threads. To obtain prices on these add 25 per cent. to price list.

FINE THREAD TAPS.

Taps with fine threads are used principally for Brass Tubing, and for Brass work generally. There has never been an established standard of threads, and in our experience, we have found that 27 threads to the inch proves more acceptable than any other. We carry them in stock in Plug Hand Tap Style, in sizes from $\frac{1}{8}$ to 1 inch, and prices are as given in following table:

Size, $\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Each, \$0.45	.45	.50	.50	.55	.55	.60	
Size, $\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Each, \$0.70	.80	.90	1.05	1.20	1.60	2.00	

Dies with 27 threads to the inch to match these will be found on page 145.

OVER-SIZE TAPS.

The term "over-size" as applied to taps, is not as indefinite a quantity as the name itself might signify. In any of the manufacturers' or trade catalogues, printed up to within the past year or two, the following announcement will almost invariably be found in connection with certain styles of taps, "Unless otherwise advised, orders will be filled with taps $\frac{1}{16}$ of an inch over-size for rough iron."

This announcement is being withdrawn, and in the later catalogues it is plainly stated that exact size taps will always be sent, *unless otherwise specified*.

The common use of over-size Taps was due to the fact, that the ordinary round bar iron sold throughout the country, was always rolled from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch larger than the stated size. For example— $\frac{1}{2}$ inch round iron (so-called) measured nearly $\frac{1}{16}$, and $\frac{3}{4}$ inch, $\frac{1}{8}$.

At the present time, and for some few years past, rolling mills have sent out round iron that is made exact to size, or practically so.

The use of over-size taps, for certain purposes, is still continued, however. We would judge that more than nine-tenths of the Blacksmiths' Sets of Taps and Dies, such as the "Little Giant," "Lightning," "Green River," etc., etc., are furnished with the taps and dies both $\frac{1}{16}$ of an inch over-size.

The Hand Nut Tap, Fig. 533, and the Bit Brace Tap, Fig. 542, are sold almost invariably $\frac{1}{16}$ of an inch over-size; and Machine, or Nut Taps, Fig. 534, are sold over-size in the proportion of about three to one of exact size.

PREVENTING TOOLS FROM RUSTING.

—A simple preparation employed by Professor Olmstead, of Yale College, for the preservation of scientific apparatus, and which he long ago published for the general good, declining to have it patented, is made by the slow melting together of six or eight parts of lard to one of resin, stirring until cool. This remains semi-fluid, ready for use; the resin preventing rancidity and supplying an air tight film. Rubbed on a bright surface ever so thinly, it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine.

TAP DRILL TABLES.

The following tables present a list of the size of drills for drilling holes that are to be tapped.

FOR HAND AND NUT TAPS, V THREADS.

The sizes given here are suitable for tapping full threads.

Diam. of Tap.	Size of Drill.	Diam. of Tap.	Size of Drill.
$\frac{1}{2}$ x 20	No. 14	$\frac{3}{4}$ x 10	$\frac{1}{2}$
$\frac{1}{2}$ x 24	" 8	$\frac{3}{4}$ x 12	$\frac{1}{2}$
$\frac{7}{16}$ x 18	C	$\frac{1}{2}$ x 9	$\frac{1}{4}$
$\frac{7}{16}$ x 20	E	1 x 8	$\frac{1}{2}$
$\frac{1}{2}$ x 14	K	1 $\frac{1}{2}$ x 7	$\frac{1}{2}$
$\frac{7}{16}$ x 16	M	1 $\frac{1}{2}$ x 7	1 $\frac{1}{2}$
$\frac{1}{2}$ x 18	N	1 $\frac{1}{2}$ x 6	1 $\frac{1}{2}$
$\frac{7}{16}$ x 14	R	1 $\frac{1}{2}$ x 6	1 $\frac{1}{2}$
$\frac{1}{2}$ x 12	$\frac{1}{2}$	1 $\frac{1}{2}$ x 5	1 $\frac{1}{2}$
$\frac{1}{2}$ x 18	Y	1 $\frac{1}{2}$ x 5	1 $\frac{1}{2}$
$\frac{7}{16}$ x 12	$\frac{1}{2}$	1 $\frac{1}{2}$ x 4 $\frac{1}{2}$	1 $\frac{1}{2}$
$\frac{1}{2}$ x 11	$\frac{1}{2}$	2 x 4 $\frac{1}{2}$	1 $\frac{1}{2}$
$\frac{1}{2}$ x 12	$\frac{1}{2}$		

FOR HAND AND NUT TAPS, WITH U. S.

STANDARD THREADS.

Diam. of Tap.	Size of Drill.	Diam. of Tap.	Size of Drill.
$\frac{1}{2}$ x 20	No. 11	1 x 8	$\frac{1}{2}$
$\frac{7}{16}$ x 18	D	1 $\frac{1}{2}$ x 7	$\frac{1}{2}$
$\frac{1}{2}$ x 16	N	1 $\frac{1}{2}$ x 7	1 $\frac{1}{2}$
$\frac{7}{16}$ x 14	T	1 $\frac{1}{2}$ x 6	1 $\frac{1}{2}$
$\frac{1}{2}$ x 13	$\frac{1}{2}$	1 $\frac{1}{2}$ x 6	1 $\frac{1}{2}$
$\frac{7}{16}$ x 12	$\frac{1}{2}$	1 $\frac{1}{2}$ x 5 $\frac{1}{2}$	1 $\frac{1}{2}$
$\frac{1}{2}$ x 11	$\frac{1}{2}$	1 $\frac{1}{2}$ x 5	1 $\frac{1}{2}$
$\frac{1}{2}$ x 10	$\frac{1}{2}$	1 $\frac{1}{2}$ x 5	1 $\frac{1}{2}$
$\frac{1}{2}$ x 9	$\frac{1}{2}$	2 x 4 $\frac{1}{2}$	1 $\frac{1}{2}$

For machine screw and small fractional size taps, the following tables give the sizes of drills to be used with each tap. These drills are not intended to give a perfectly full thread, but full enough for all practical purposes.

TABLE FOR MACHINE SCREW TAPS.

Size of Tap.	No. of Threads.	Size of Drill.	Size of Tap.	No. of Threads.	Size of Drill.
No. 2	56	46	No. 7	30	31
" 3	48	47	" 7	32	32
" 4	56	45	" 8	32	30
" 4	36	44	" 9	32	26
" 4	40	42	" 10	24	26
" 5	36	41	" 10	32	21
" 5	40	36	" 11	24	21
" 6	32	37	" 12	24	19
" 6	36	35	" 13	22	17

TABLE FOR MACHINE SCREW TAPS.—*Con'd.*

Size of Tap.	No. of Threads.	Size of Drill.	Size of Tap.	No. of Threads.	Size of Drill.
No. 13	24	15	No. 18	18	2
" 14	20	13	" 20	16	B
" 15	20	10	" 20	18	E
" 16	18	8	" 22	16	H
" 16	20	5	" 24	16	L
" 18	16	2	" 30	14	U

TABLE FOR SMALL FRACTIONAL-SIZE TAPS.

Size of Tap.	No. of Threads.	Size of Drill.	Size of Tap.	No. of Threads.	Size of Drill.
$\frac{1}{16}$	60	No. 52	$\frac{1}{16}$	32	No. 28
$\frac{1}{8}$	48	" 49	$\frac{1}{8}$	36	" 27
$\frac{3}{16}$	56	" 48	$\frac{1}{8}$	40	" 26
$\frac{1}{4}$	40	" 44	$\frac{3}{16}$	24	" 28
$\frac{5}{16}$	44	" 44	$\frac{1}{4}$	30	" 27
$\frac{3}{8}$	48	" 43	$\frac{3}{16}$	32	" 25
$\frac{1}{2}$	36	" 42	$\frac{1}{2}$	24	" 23
$\frac{1}{2}$	40	" 41	$\frac{1}{2}$	28	" 22
$\frac{1}{2}$	44	" 39	$\frac{1}{2}$	32	" 20
$\frac{3}{4}$	32	" 37	$\frac{3}{4}$	24	" 18
$\frac{3}{4}$	36	" 36	$\frac{3}{4}$	28	" 17
$\frac{3}{4}$	40	" 35	$\frac{3}{4}$	32	" 13
$\frac{3}{4}$	32	" 33	$\frac{3}{4}$	24	" 14
$\frac{3}{4}$	36	" 31	$\frac{3}{4}$	28	" 12
$\frac{3}{4}$	40	" 30	$\frac{3}{4}$	32	" 10

POSTAGE ON TAPS.

Any of the machine screw and small fractional size taps can be sent by mail for 2 cents each.

Hand, Patch Bolt, Blacksmith Taper, Bit Stock, and Hob Taps, can be sent by mail at rates given in the following table:

Size,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Postage,	1 ct.	2 cts.	3 cts.
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
Postage,	4 cts.	6 cts.	9 cts.
Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$
Postage,	2 cts.	4 cts.	6 cts.
Size,	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$
Postage,	9 cts.	13 cts.	18 cts.
Size,	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{8}$
Postage,	24 cts.	32 cts.	40 cts.

Nut taps at following rates:

Size,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Postage,	2 cts.	4 cts.	6 cts.
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
Postage,	9 cts.	13 cts.	18 cts.
Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$
Postage,	24 cts.	32 cts.	40 cts.

OUR GUARANTEE.—What we mean by warranting tools is, that if tools are not of first quality and as represented in every particular, they may be returned to us and we will replace them at our own expense, or, if desired, will refund the price paid. (We ask, however, that we be notified always before tools are sent back).

It can be seen by the above guarantee that we have every confidence in the quality of our tools.

SCREW CUTTING DIES.



In presenting this new list of Patent Adjustable Round Dies, notice is hereby called to the fact that it is by far the most complete list ever before offered to the

FIG. 546. trade.

Mechanics will fully appreciate its completeness, which, in connection with our list of Machine Screw Taps, enables them to supply their exact wants as regards sizes and threads far better than ever before. We beg to again call especial attention to the sizes which appear in bold-faced type, screws are kept in stock to match these. Screws for other sizes and threads are furnished to order only.

NO. 0 ADJUSTABLE ROUND DIES.

$\frac{1}{16}$ inch diameter, $\frac{1}{8}$ inch thick.

Size.	Each.	Threads to Inch.	
No. 2	\$0.40	48, 56, 64,	
" 3	.40	40, 48, 56,	
" 4	.40	32, 36, 40,	
" 5	.40	32, 36, 40,	
" 6	.40	32, 36, 40,	
" 7	.40	28, 30, 32,	
" 8	.40	24, 30, 32,	
" 9	.40	24, 30, 32,	
" 10	.40	24, 30, 32,	
" 11	.40	24, 28, 30,	
" 12	.40	22, 24, 28,	
" 13	.40	20, 22, 24,	
" 14	.40	20, 22, 24,	
" 15	<i>new</i> .40	18, 20, 22,	
" 16	<i>Signal</i> .40	16, 18, 20,	
Diam.			
$\frac{1}{16}$	.40	48, 56, 60,	
$\frac{1}{8}$	.40	32, 36, 40,	
$\frac{1}{4}$	.40	32, 36, 40,	
$\frac{3}{8}$	.40	30, 32, 36,	
$\frac{1}{2}$	.40	30, 32, 36,	
$\frac{5}{8}$	.40	24, 30, 32,	
$\frac{3}{4}$	.40	24, 30, 32,	
$\frac{7}{8}$	.40	20, 22, 24,	
$\frac{15}{16}$	.40	20, 22, 24,	
$\frac{1}{2}$	.40	20, 22, 24,	
$\frac{5}{8}$	.40	20, 22, 24,	

Price for dies smaller than No. 2 given on application.

Other sizes or threads furnished at 50 per cent. advance on above prices. For No. 0 Dies in sets, see pages 152 and 153.

Price of Stock for No. 0 Dies, 75 cents.

Any of the above Dies can be sent by mail upon receipt of two cents extra for postage.

NO. 1 ADJUSTABLE ROUND DIES.

1 inch diameter, $\frac{1}{8}$ inch thick.		Threads to inch.	
Size.	Each.		
No. 14	\$0.75	20, 24,	
" 16	.75	16, 18, 24,	
" 18	.75	16, 18, 20,	
" 20	.75	16, 18, 20,	
" 24	.75	16, 18,	
Diam.			
$\frac{1}{8}$	.75	24, 30, 32,	
$\frac{1}{4}$	.75	24, 30, 32,	
$\frac{1}{2}$	.75	20, 24,	
$\frac{3}{4}$	.75	16, 18,	
$\frac{15}{16}$	.75	14, 16, 18,	

Other sizes or threads furnished at 50 per cent. advance on above prices. Price of stock for No. 1 Dies, \$1.00.

Any of the above Dies can be sent by mail upon receipt of 5 cents extra for postage.



FIG. 547. LATHE DIE HOLDER.

The above die-holder can be used for running in lathe or drill. It is made in two sizes: No. 0 taking the No. 0 dies, $\frac{1}{16}$ diameter (in opposite column); No. 1 taking the No. 1 dies in above list. Price of either size holder, \$1.00. Postage 8 cents extra.



FIG. 548. BIT BRACE DIE-HOLDER

The Bit Brace Die-Holder, Fig. 548, will take in the No. 1 Adjustable Round Dies, given in above list. Price of holder, \$1.00. Postage, 10 cents extra.

NO. 2 ADJUSTABLE ROUND DIES.

$\frac{1}{4}$ inches diameter, $\frac{1}{4}$ inch thick.

Diam.	Each.	Threads to inch.	
$\frac{1}{4}$ inch.	\$1.00	24, 30, 32	
$\frac{1}{2}$ "	1.00	18, 20, 24	
$\frac{3}{4}$ "	1.00	16, 18,	
$\frac{1}{2}$ "	1.00	14, 16, 18	
$\frac{3}{4}$ "	1.00	14, 16,	
$\frac{1}{2}$ "	1.00	12, 13, 14	

Other diameters or threads furnished at 50 per cent. advance on above prices.

Postage on No. 2 Dies, 6 cents extra.

NO. 3 ADJUSTABLE ROUND DIES.

2 inches diameter, $\frac{1}{4}$ inch thick.

Diam.	Each.	Threads to Inch.
$\frac{1}{4}$ inch.	\$1.25	18, 20, 24
$\frac{1}{8}$ "	1.25	16, 18, 20
$\frac{3}{16}$ "	1.25	14, 16, 18
$\frac{1}{2}$ "	1.25	14, 16,
$\frac{5}{8}$ "	1.25	12, 13, 14
$\frac{3}{4}$ "	1.90	10, 11, 12
$\frac{7}{8}$ "	2.25	10, 12,

Other diameters or threads furnished at 50 per cent. advance on above prices.

Postage on No. 3 Dies, 8 cents extra.

NO. 4 ADJUSTABLE ROUND DIES

 $2\frac{1}{2}$ inches diameter, $\frac{1}{4}$ inch thick

Diam.	Each.	Threads to Inch.
$\frac{1}{4}$ inch	\$1.50	14, 16, 18
$\frac{1}{8}$ "	1.50	14, 16,
$\frac{3}{16}$ "	1.50	12, 13, 14
$\frac{1}{2}$ "	2.00	10, 11, 12
$\frac{5}{8}$ "	2.35	10, 12,
$\frac{3}{4}$ "	2.75	9, 10,
$\frac{7}{8}$ "	3.25	8,

Other diameters or threads furnished at 50 per cent. advance on above prices.

Postage on No. 4 Dies, 10 cents extra.

FINE THREAD DIES.

The Dies with fine threads are used principally for Brass tubing and Brass work generally. There has never been an established standard of threads, and in our experience, we have found that 27 threads to the inch proves more acceptable than any other. We carry them in stock in sizes from $\frac{1}{4}$ to 1 inch. For Taps to match these dies, see page 142.

Dies any size up to $\frac{1}{4}$ inch inclusive, 1 inch outside diameter, \$1.13 each. Dies any size up to $\frac{1}{4}$ inch inclusive, $1\frac{1}{2}$ inch outside diameter, \$1.50 each.

For prices of fine thread Dies in sizes above $\frac{1}{4}$ inch, add 50 per cent to prices of No. 3 (2 inches in diameter) and No. 4 ($2\frac{1}{2}$ inches in diameter) Adjustable Round Dies, given in top of this column. Thus, a $\frac{1}{4}$ inch fine thread Die, 2 inches in diameter, would be \$1.87, and a $\frac{1}{4}$ inch, $2\frac{1}{2}$ inches in diameter, would be \$3.52.

OTHER SIZES.

Use Standard Sizes and Threads as far as is possible. The use of Odd and Special threads leads to much annoyance, vexation of spirit, and extra expense.

SOLID BOLT DIES.

Solid Bolt Dies, with both "V" and "Franklin Institute" threads are kept in stock, made from steel $2\frac{1}{2}$ and 3 inches square, as per list below.

The Dies with "V" threads we carry in stock both exact and $\frac{1}{16}$ over-size. All orders for "Franklin Institute" (U. S. Standard) threads are filled with exact size, and with threads conforming to the U. S. Standard, as per Fig. 528, and list given on page 137.

We can also furnish the Solid Bolt Dies, made from steel $2\frac{1}{2}$ and 3 inches square, to fit the Bolt Cutters made by Boynton & Plummer, Worcester, Mass. These have beveled edges, and can be furnished either exact or over-size; but are more commonly used in the latter style.

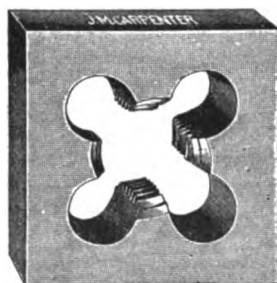


FIG. 549. SOLID BOLT DIE.

Size.	Each.	Threads to Inch.	Square.	Thick.
$\frac{1}{4}$	\$1.35	18, 20,	$2\frac{1}{2}$ in.	$\frac{1}{4}$ in.
$\frac{1}{8}$	1.35	16, 18,	$2\frac{1}{2}$ "	$\frac{1}{8}$ "
$\frac{3}{16}$	1.35	14, 16,	$2\frac{1}{2}$ "	$\frac{3}{16}$ "
$\frac{1}{2}$	1.35	14,	$2\frac{1}{2}$ "	$\frac{1}{2}$ "
$\frac{5}{8}$	1.35	12, 13,	$2\frac{1}{2}$ "	$\frac{5}{8}$ "
$\frac{3}{4}$	1.50	12,	$2\frac{1}{2}$ "	$\frac{3}{4}$ "
$\frac{7}{8}$	1.50	10, 11,	$2\frac{1}{2}$ "	$\frac{7}{8}$ "
1	1.65	10,	$2\frac{1}{2}$ "	1 "
$1\frac{1}{8}$	1.80	9,	$2\frac{1}{2}$ "	$1\frac{1}{8}$ "
$1\frac{1}{4}$	2.00	8,	$2\frac{1}{2}$ "	1 "
$1\frac{1}{2}$	2.25	7,	$2\frac{1}{2}$ "	1 "
$1\frac{3}{4}$	2.45	7,	$2\frac{1}{2}$ "	1 "
$1\frac{7}{8}$	2.70	6,	3 "	1 "
2	2.90	6,	3 "	1 "
$2\frac{1}{8}$	3.15	5,	3 "	1 "
$2\frac{1}{4}$	4.05	5,	3 "	$1\frac{1}{4}$ "
$2\frac{1}{2}$	4.85	$4\frac{1}{2}$,	$3\frac{1}{2}$ "	$1\frac{1}{2}$ "
$2\frac{3}{4}$	5.60	$4\frac{1}{2}$,	4 "	2 "

Over-size dies take same list as exact size; for instance, a $\frac{1}{16}$ die is the same price as a $\frac{1}{16}$ die.

SCREW PLATES, OR STOCKS AND DIES.

In the past twenty years or so there has been considerable of an evolution both in the manufacture and sale of screw-plates. In the old style of taps and dies, duplication or interchangeability of pieces was evidently never considered. The bolt was threaded and the nut tapped to fit, or vice versa. The taps were usually tapering so that if a size could not be obtained in one part it could in another. The cut, Fig. 550, is reproduced from an illustration in P. S. Stubs' catalogue just received; it represents about as primitive a style as can well be imagined. From the fact of its being shown in this catalogue, we are led to infer that there must still be a sale (in some lands) for this style of plate.

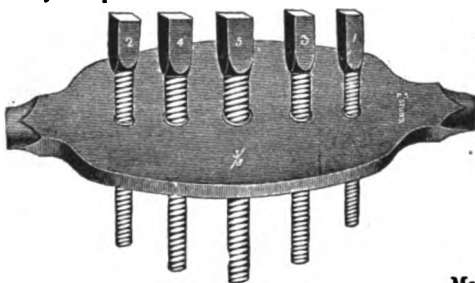


FIG. 550.

We sell quite a few small size Stubs' plates, Fig. 564, page 148. They are used mainly by model makers for small tinkering work, where the sizes wanted are odd, and unlike anything "In the heavens above, or on the earth beneath."

In 1829 Daniel B. King started the manufacture of screw-plates in Waterford, N. Y., and this factory still continues in operation, making the style of plates shown in Figs. 572 and 573, page 151. This style of plate has been always furnished with taper taps, and without reference to any standard as far as either sizes or threads are concerned; in some cases, two taps and two sets of dies being used to cut all sizes from $\frac{1}{8}$ to $\frac{1}{2}$ inch.

The machinists' plates made by Card & Co., page 149, are similar in design, but are better made in every way; are furnished in great variety of standard sizes, and are supplied with machinist hand taps.

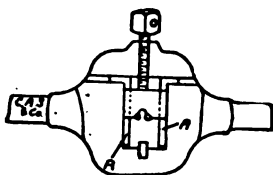


FIG. 551. "MORSE."

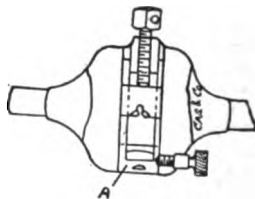


FIG. 552. "J. M. CARPENTER."

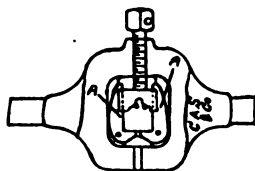


FIG. 553. BILLINGS & SPENCER.

Machinists' plates are used quite extensively. There are three different makes, Morse, Fig. 551; Carpenter, Fig. 552; and Billings, Fig. 553; all first-class as regards finish and quality; the principal difference being the manner in which the dies are moved out of—and placed in—the stock.

We now come to what may be more properly termed the "modern" style of screw-plate.

These dies and taps do their work at a single cut, and any one of them is superior to the old style "jam" plate. They are all adjustable and a variation of $\frac{1}{16}$ to $\frac{1}{8}$ of an inch can be obtained. The greater proportion of these plates are furnished with taps and dies $\frac{1}{8}$ of an inch over-size for rough iron, and, unless otherwise advised, we fill orders in this way.

They can be furnished with either V, Franklin Institute (U. S. Standard),

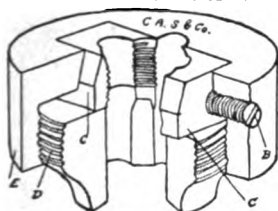


FIG. 554. LITTLE GIANT.

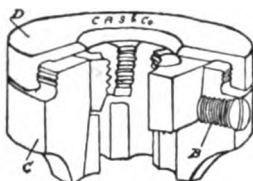


FIG. 555. BUTTERFIELD.

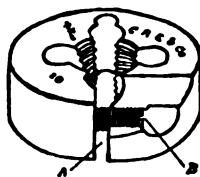


FIG. 556. REECE.

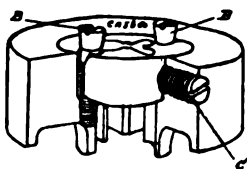


FIG. 557. LIGHTNING.

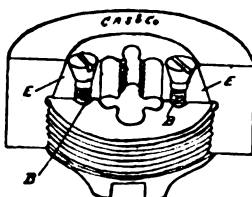


FIG. 558. ELECTRIC.

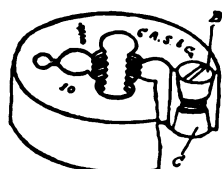


FIG. 559. EASY

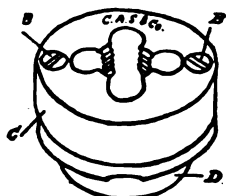


FIG. 560. GREEN RIVER.

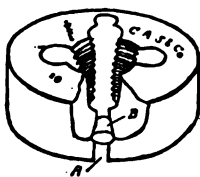


FIG. 561. CARPENTER.

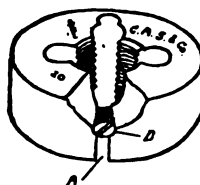


FIG. 562. CARD.

or Whitworth form of thread. All orders are filled with V threads, unless otherwise specified.

We are now selling a great many of these plates with "exact size" dies and taps for fine machine work, and they are sold quite extensively in the smaller sizes with machine screw threads. Can also furnish Left-Hand Dies and Taps when desired.

We have sold and used, at different times, practically all of the odd, different styles that have been—or are being—made, and, while we attempt, as a matter of possible interest, to describe all of the principal ones, we prefer to confine our sales to those which are, in our judgment,

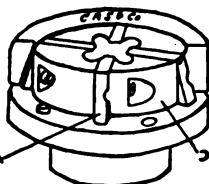


FIG. 563. GRANT.

the best. Prices of the leading styles vary but little.

The "Lightning" Die (Fig. 557) was brought out in 1872. It is the pioneer in this class of dies, and doubtless is the most widely known. The above cut shows the construction. The adjustment is obtained by slackening the bevel head screws B B, and "set" by the binding screw C. Another binding screw not shown in cut, is placed opposite the one shown.

IMPROVEMENT is characteristic of the present age, and especially is this true in respect to the mechanical arts; therefore, for the benefit of those interested in Thread-Cutting Dies, we have had the above cuts made to illustrate wherein each make differed. There are three or four other styles made and sold, but we do not show them, as they are direct imitations of some shown above.

The Green River Die, Fig. 560, is made by the same concern, and differs but little from the Lightning. These dies have no collet, the stock being split; is drawn together by a clamp screw, thus holding the die firmly in place.

Reece Bros.' Die, Fig. 556, was brought out in 1876. This die is made solid and a slot cut through one side; it is then tempered, bringing the surfaces together. Adjustment is made by the flat point set screw B. This is a very superior die, and if proper means had been used in pushing its sale, the Reece Screw-Plate might have been the leading screw-plate of the country to-day.

The Carpenter Die, Fig. 561, is similar to Reece Bros., the adjustment being made by a taper-pin, shown in cut. The pin being driven out allows the die to come close together.

The Card Die, Fig. 562, is quite similar to the Carpenter, the only difference being that a taper screw is used in place of a taper pin.

The Easy Die, Fig. 559, is likewise similar in form to the three styles described above. The adjustment in this is obtained by the use of taper head screw B, and taper nut C.

The Electric Die, Fig. 558, is comparatively new. It is adjusted by means of bevel-head screws, similar to those used in the Lightning Die; but the dies are "set" or fixed in a different manner; they are made beveling, and are forced up and held in a collet, which is likewise beveled to receive them.

Wells Bros.' "Little Giant" Die, shown in Fig. 554, has been on the market about fifteen years, and is perhaps after the Lightning, the best known. It is a good tool. The manner of adjustment is explained by cut.

Butterfield, Fig. 555, is somewhat like the "Little Giant," but in our judgment not as good.

The Grant Die, Fig. 563, has four chasers; two of the screws serve to move the chasers toward the centre; the other two hold the rings in any desired position. It is a handsomely made tool, rather high priced, and is sold mostly with the U. S. Standard form of Thread. It is made by the Pratt & Whitney Company of Hartford, Conn.

Another, and quite a different type of screw-plate is the Duplex, style of which is shown in Fig. 688, page 177, in connection with Pipe Threading Tools. This plate, however, is sold almost exclusively for threading pipe, there being but a limited demand for the Duplex plate with bolt dies.

We might also mention—in passing—the Gardner and Armstrong Screw Plates, the dies of which are not dissimilar in form from those used in the Little Giant Screw Plate, Fig. 554, but are held in the stock in a different manner.



FIG. 564. STUBS' SCREW PLATE.
(No. 180. Notched.)

The plain screw-plate differs from the notched (shown in cut), in that it does not have the holes drilled on side of die for cutting and clearance.

No. 179, plain,	5	7	10 sizes.
Price, complete,	\$0.90	1.40	2.25
Cuts from	$\frac{1}{16}$ to $\frac{1}{8}$	$\frac{1}{8}$ to $\frac{1}{4}$	$\frac{1}{4}$ to $\frac{1}{2}$ in.

No. 179, notched,	5	7	10 sizes.
Price, complete,	\$1.60	2.40	3.60
Cuts same sizes as No. 179, plain.			

No. 180, plain,	5	7	10 sizes.
Price, complete,	\$0.90	1.40	2.25
Cuts from	$\frac{1}{16}$ to $\frac{1}{8}$	$\frac{1}{8}$ to $\frac{1}{4}$	$\frac{1}{4}$ to $\frac{1}{2}$ in.

No. 180, notched,	5	7	10 sizes.
Price, complete,	\$1.60	2.40	3.60
Cuts same sizes as No. 180, plain.			



FIG. 565. OUTSIDE CHASER.



FIG. 566. INSIDE CHASER.

SCREW CHASERS.

These are used for chasing screws by hand in the lathe. We carry the following threads in stock: 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 36, 40, 44, 48 and 50 threads to the inch. Price, per pair (inside and outside), 60 cents. Postage on screw chasers, 8 cents each.

MACHINISTS' GUNSMITHS' AND AMATEURS' SCREW-PLATES.

The Screw-Plates described on this page are vastly superior to the same type of plate made in Europe, and formerly imported. The Taps and Dies are accurate as regards sizes and lead of threads, and any parts can be duplicated at slight expense. The majority of these are light, and it costs but a small sum to send them by mail; they are all put up in neat wooden cases. As the assortment is so large and varied, we have, as a possible aid to our customers, designated the sizes that are more commonly used and sold, by an asterisk (*) placed before the number.

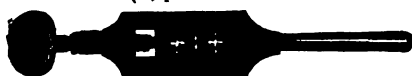


FIG. 567.

*No. 00, \$2.25, 6 inches long; has 4 pairs of Dies and 4 Taps, cutting $\frac{1}{16}$, 64; $\frac{1}{8}$, 56; $\frac{3}{16}$, 48; $\frac{1}{2}$, 40.

*No. 00A, \$2.25, 6 inches long; has 3 pairs of Dies and 4 Taps, cutting 4, 36; 6, 32; 8, 32; 10, 24.

*No. 0, \$2.70, 7 $\frac{1}{2}$ inches long; has 4 pairs of Dies and 4 Taps, cutting $\frac{1}{16}$, 48; $\frac{1}{8}$, 40; $\frac{3}{16}$, 32; $\frac{1}{2}$, 24.

*No. 0A, \$2.95, 7 $\frac{1}{2}$ inches long; has 3 pairs of Dies and 4 Taps, cutting 10, 24; 12, 24; 14, 20; 16, 18.

No. 00B, \$2.95, 6 inches long; has 4 pairs of Dies and 4 Taps, cutting 4, 48; 6, 40; 8, 36; 10, 32.

No. 00C, \$2.25, 6 inches long; has 4 pairs of Dies and 4 Taps, cutting 4, 40; 6, 36; 8, 34; 10, 30.

No. 0B, \$2.95, 7 $\frac{1}{2}$ inches long; has 4 pairs of Dies and 4 Taps, cutting 8, 36; 10, 34; 12, 30; 14, 28.

No. 0C, \$2.95, 7 $\frac{1}{2}$ inches long; has 4 pairs of Dies and 4 Taps, cutting 8, 32; 10, 30; 12, 28; 14, 26.



FIG. 568.

*No. 1 $\frac{1}{2}$, \$2.95, 9 inches long; has 4 pairs of Dies and 4 Taps, cutting 6, 32; 8, 32; 10, 24; 14, 20.

(10)

*No. 1 $\frac{1}{4}$ A, \$3.10, 9 inches long; has 3 pairs of Dies and 4 Taps, cutting 14, 20; 16, 18; 18, 18; 20, 16.

No. 1 $\frac{1}{2}$ B, \$3.15, 9 inches long; has 3 pairs of Dies and 4 Taps, cutting 12, 26; 14, 26; 16, 24; 18, 22.

No. 1 $\frac{1}{2}$ C, \$3.15, 9 inches long; has 3 pairs of Dies and 4 Taps, cutting 12, 32; 14, 30; 16, 30; 18, 28.



FIG. 569.

*No. 1, \$4.05, 7 inches long; has 3 pairs of Dies and 6 Taps, cutting 4, 40; 6, 40; 4, 36; 6, 36; 8, 32; 10, 32.

*No. 2, \$4.05, 8 inches long; has 3 pairs of Dies and 6 Taps, cutting 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 20.

No. 2A, \$4.50, 8 inches long; has 3 pairs of Dies and 6 Taps, cutting 12, 24; 14, 24; 12, 22; 14, 22; 16, 20; 18, 20.

No. 2B, \$4.50, 8 inches long; has 3 pairs of Dies and 6 Taps, cutting 12, 26; 14, 26; 12, 28; 14, 28; 12, 30; 14, 30.

No. 2 $\frac{1}{2}$ G, \$4.50, 11 $\frac{1}{2}$ inches long; has 3 pairs of Dies and 3 Taps, cutting $\frac{1}{8}$, 20; $\frac{1}{4}$, 18; $\frac{3}{8}$, 16.

No. 2 $\frac{1}{2}$ I, \$7.00, 11 $\frac{1}{2}$ inches long; has 5 pairs of Dies and 5 Taps, cutting $\frac{1}{8}$, 24; $\frac{1}{4}$, 22; $\frac{3}{8}$, 20; $\frac{1}{2}$, 18; $\frac{3}{4}$, 16.

No. 3H, \$9.00, 14 inches long; has 6 pairs of Dies and 6 Taps, cutting $\frac{1}{8}$, 26; $\frac{1}{4}$, 24; $\frac{3}{8}$, 22; $\frac{1}{2}$, 20; $\frac{3}{4}$, 18; $\frac{1}{1}$, 16.

All Screw Plates on this page are furnished with Plug Taps.

EXTRA STOCKS AND DIES.

No.	STOCKS.		Per Pair.	Per Set.
	Length. In.	Each.		
00	6	\$1.00	\$0.50	\$1.00
0	7 $\frac{1}{2}$	1.25	.50	1.00
1 $\frac{1}{2}$	9	1.25	.50	1.00
1	7	1.25	.50	
2	8	1.35	.50	
2 $\frac{1}{2}$	11 $\frac{1}{2}$	1.75	.75	
3	14	2.50	.75	

TORN CATALOGUES.—Every article in this Book is described either by figure, number, or name. We beg our customers not to cut or tear out parts of pages as this destroys it for reference.

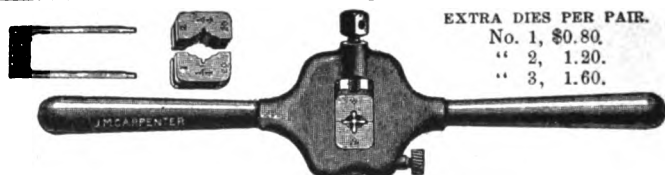


FIG. 570. MACHINISTS' SCREW PLATE.

The style of Screw Plate shown in Fig. 570 is sold almost entirely to Machinists and Engineers. There are three makers of this style of Plate: The Morse Twist Drill Co., Billings & Spencer and J. M. Carpenter Co. These Plates are light and strong; both the Plates and Dies are made to Standard Gauges and are interchangeable; and in every respect are first-class tools. On page 146 will be found sketches showing construction of all three styles. We prefer the style made by the J. M. Carpenter Co. This design admits of a change of Dies with quickness and ease, and when the Dies and ways have been removed, leaves the inside of Plate open and free to clean.

The style of Taps furnished with these Plates are the Machinists' Taper Hand Taps, Fig. 530. Plug Hand Taps, Fig. 531, will be sent if preferred.

Dies with United States Standard form of threads (See Fig. 528) are kept in stock and furnished at same price as V threads.

Dies with Whitworth form of threads, Fig. 529, are made to order only, at same prices.

No. 1, \$5.15, 15 inches long; has 3 pairs of Dies and 3 Taps, cutting $\frac{1}{4}$, 20; $\frac{1}{2}$, 16; $\frac{3}{4}$, 12.

No. 1A, \$4.00, same as above, without Taps.

No. 1B, \$6.25, 15 inches long; has 4 pairs of Dies and 4 Taps, cutting $\frac{1}{4}$, 20; $\frac{1}{2}$, 18; $\frac{3}{4}$, 16; $\frac{1}{1}$, 12.

No. 1C, \$4.80, same as above, without Taps.

No. 1D, \$9.00, 15 inches long; has 6 pairs of Dies and 6 Taps, cutting $\frac{1}{4}$, 20; $\frac{1}{2}$, 18; $\frac{3}{4}$, 16; $\frac{1}{1}$, 14; $\frac{1}{1}$, 12; $\frac{1}{1}$, 11.

No. 1E, \$6.40, same as above, without Taps.

No. 2, \$10.95, 23 inches long; has 4 pairs of Dies and 4 Taps, cutting $\frac{1}{4}$, 12; $\frac{1}{2}$, 11; $\frac{3}{4}$, 10; $\frac{1}{1}$, 9.

No. 2A, \$8.00, as above, without Taps.

No. 2B, \$15.00, 23 inches long; has 6 pairs of Dies and 6 Taps, cutting $\frac{1}{4}$, 16; $\frac{1}{2}$, 12; $\frac{3}{4}$, 11; $\frac{1}{1}$, 10; $\frac{1}{1}$, 9; 1. 8.

No. 2C, \$10.35, as above, without Taps.

No. 3, \$16.00, 31 inches long; has 4 pairs of Dies and 4 Taps, cutting $\frac{1}{4}$, 9; 1. 8; $\frac{1}{2}$, 7; $\frac{3}{4}$, 7.

No. 3A, \$10.40, as above, without Taps.

No. 3B, \$22.30, 31 inches long; has 6 pairs of Dies and 6 Taps, cutting $\frac{1}{4}$, 10; $\frac{1}{2}$, 9; 1. 8; $\frac{1}{2}$, 7; $\frac{3}{4}$, 7; $\frac{1}{1}$, 6.

No. 3C, \$13.60, as above, without Taps.



FIG. 571. PUMP FITTERS' SCREW-PLATES.

These plates are furnished in but two sizes, the threads being coarser than Standard sizes.

No. 12, \$3.00, 12 $\frac{1}{2}$ inches long; has 2 pairs of Dies, cutting $\frac{1}{4}$, 14; $\frac{1}{2}$, 12.

No. 13, \$3.50, 15 $\frac{1}{2}$ inches long; has 3 pairs of Dies, cutting $\frac{1}{4}$, 14; $\frac{1}{2}$, 12; $\frac{3}{4}$, 12.

Taps for the above plates at following prices: $\frac{1}{4}$ inch, 37 cts.; $\frac{1}{2}$ inch, 40 cts.; $\frac{3}{4}$ inch, 47 cts.

POSTAGE ON ARTICLES.—Don't send the exact catalogue price on articles and then ask us to send them by mail. We receive hundreds of orders for small articles on which the postage ranges from two cents upwards; these come often from a great distance, and the postage would be a few cents when the express charges would be five or ten times as much. We cannot afford to spend the time writing to our customers, asking them to remit us the postage on these goods, and we often have to suffer the loss of this few cents postage, which on thousands of orders amounts to considerable. Send what you think is right for postage, and if there is any over we will return it in every case.

KING'S STOCKS AND DIES.*

This line of Stocks and Dies has been on the market upwards of 60 years; there has been, and always will be, a large sale for these plates on account of the low

No. 15, \$8.00, cuts from $\frac{1}{4}$ to $1\frac{1}{2}$ inches; has 3 pairs of Dies and 5 Taps, cutting, 8, 10 and 12 threads.

No. 23, \$4.00, cuts from $\frac{1}{4}$ to 1 inch; has 3 pairs of Dies and 3 Taps, cutting 9, 10 and 14 threads.



FIG. 572.

price at which they are sold. This is the style of Stock and Dies usually furnished with farmers' and blacksmiths' "outfits." We print here the more commonly sold sizes, and can furnish, if desired, twenty-one assortments besides these.

No. 34, \$3.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 3 Taps, cutting 10, 12 and 16 threads.

No. 34A, \$3.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 3 Taps, cutting 10, 12 and 14 threads.



FIG. 573.

The numbers which follow from 9 to 60 inclusive, are of the style as shown in Fig. 572.

No. 9, \$9.60, cuts from $\frac{1}{4}$ to $1\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 8, 10 and 12 threads to the inch.

No. 19, \$7.20, cuts from $\frac{1}{4}$ to 1 inch; has 3 pairs of Dies and 6 Taps, cutting 9, 12 and 14 threads.

No. 27, \$5.20, cuts $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 10, 12 and 16 threads.

No. 47, \$4.40, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of dies and 6 Taps, cutting 12, 14 and 18 threads.

No. 51, \$3.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 14, 18 and 22 threads.

No. 60, \$5.75, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 4 pairs of Dies and 6 Taps, cutting, 10, 12, 14 and 18 threads.

The numbers which follow from 15 to 55 inclusive, are of the style as shown in Fig. 573.

No. 34B, \$3.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 3 Taps, cutting 12, 14 and 16 threads.

No. 35, \$3.20, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 2 pairs of Dies and 2 Taps, cutting 10 and 14 threads.

No. 37, \$3.40, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 14, 18 and 22 threads.

No. 37A, \$3.40, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs Dies, and 6 Taps, cutting 12, 14 and 16 threads.

No. 37B, \$3.40, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch, has 3 pairs of Dies and 6 Taps, cutting, 14, 16 and 18 threads.

No. 41, \$2.95, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 16, 20 and 26 threads.

No. 41A, \$2.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 14, 16 and 18 threads.

No. 41B, \$2.95, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 6 Taps, cutting 16, 18 and 20 threads.

No. 53, \$2.60, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 4 pairs of Dies and 4 Taps, cutting 16; 20, 24 and 32 threads.

No. 55, \$2.35, cuts from $\frac{1}{4}$ to $\frac{1}{2}$ inch; has 3 pairs of Dies and 4 Taps, cutting 18, 20 and 24 threads.

* A great many of King's Plates are lying about shops useless, for lack of Dies. We can furnish Dies of any threads or size in pairs or sets for these Plates. Please state number of Plate when ordering Dies.

SMALL SCREW-PLATES.

The style of Screw-Plates shown on these two pages are now much more generally sold than any other. The dies and taps can be duplicated very cheaply. All of these dies and taps are made to exact standard, and we do not believe that the greatest variation would be more than two or three one-thousandths of an inch.



FIG. 574. \$3.50.

The Watchmakers' Screw Plate, Fig. 574, has dies and taps corresponding to the sizes of watch screws as follows:

Diameter, .066	.055	.045	.038
Threads, 80	100	120	140

JEWELERS' SCREW PLATE.

The Jewelers' Screw Plate is the same style as the Watchmakers', and cuts sizes $\frac{1}{16}$, $\frac{7}{32}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, $\frac{15}{16}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{3}{8}$, $\frac{1}{4}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{16}$. Price, \$3.50.



FIG. 575. BICYCLE SCREW-PLATES.

These plates will be found very convenient for use in repairing Bicycles, as the diameters and threads have been carefully selected and will fit a great variety of machines. The dies are adjustable for making a tight or loose fit.

No. 1, Bicycle Plate, \$4.50, cutting 6 sizes; machine screw sizes Nos. 6, 38; 3, 48; 3, 56. Fractional sizes $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, $\frac{15}{16}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{3}{8}$, $\frac{1}{4}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{16}$.

No. 2, Bicycle Plate, \$4.50, cutting 6 sizes; machine screw sizes Nos. 1, 64; $\frac{1}{16}$, 56; 2, 48. Fractional sizes $\frac{1}{16}$, 56; $\frac{1}{8}$, 56; $\frac{1}{4}$, 40.

No. 3, Bicycle Plate, \$9.00, cutting 14 sizes; machine screw sizes Nos. 1, 64; $\frac{1}{16}$, 56; 2, 48; 3, 48; 3, 56; 4, 42; 6, 38. Fractional sizes $\frac{1}{16}$, 52; $\frac{1}{8}$, 54; $\frac{1}{4}$, 56; $\frac{1}{2}$, 56; $\frac{3}{4}$, 40; $\frac{1}{2}$, 42; $\frac{1}{4}$, 40.

Extra Taps of above sizes, 25 cts. each. Extra Dies of above sizes, 50 cts. each.



FIG. 576. PLATE WITH GUIDES.



DIE.



GUIDE.

For some work it is desirable to have a Guide. We can furnish any of the following sets with Stock and Guides, as shown above, at an additional cost of 40 cents for the Stock, and 15 cents each for the Guides. Price of Stock only, \$1.15.

MACHINE SCREW SETS.

In connection with this list, we print herewith, the decimal equivalents of Machine Screw sizes:

Nos.	2	3	4	5	6	7	8
Diam.	.084	.097	.110	.124	.137	.150	.163
Nearest Fraction	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$
Nos.	9	10	11	12	13	14	15
Diam.	.176	.189	.203	.216	.229	.242	.255
Nearest Fraction	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$
Nos.	16	17	18	19	20	21	22
Diam.	.255	.268	.281	.295	.308	.321	.334
Nearest Fraction	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

Set No. 1S, \$4.25, contains Stock, Tap Wrench-Die, and 5 Dies and Taps:
Nos. 4 6 8 10 12
Threads, 36 32 32 24 24

Set No. 2S, \$5.50, contains Stock, Tap Wrench-Die, and 7 Dies and Taps:
Nos. 4 6 8 10 12 14 16
Threads, 36 32 32 24 24 20 18

Set No. 3S, \$7.25, contains Stock, Tap Wrench-Die, and 10 Dies and Taps:
Nos. 2 3 4 5 6
Threads, 56 48 36 40 32
Nos. 8 10 12 14 16
Threads, 32 24 24 20 18

Set No. 4S, \$10.00, contains Stock, Tap Wrench-Die, and 15 Dies and Taps:
Nos. 2 3 4 5 6
Threads, 56 48 36 40 32
Nos. 7 8 9 10 11
Threads, 32 32 28 24 24
Nos. 12 13 14 15 16
Threads, 24 22 20 20 18

We wish to call attention to our new method of putting up these Screw-Plates. The five and seven size sets, Nos. 1 S, 2 S, 5 S and 6 S are put up in cases made to contain ten sizes of Taps and Dies.

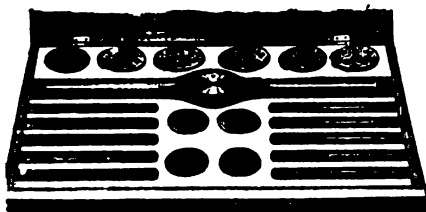


FIG. 577. NO. 1S MACHINE SCREW SET.

The ten-size sets, Nos. 3 S and 7 S, are put up in cases that will hold fifteen Taps and Dies.

We believe that this will be considered a great convenience by those who have (or may want to add) extra Taps and Dies, thus furnishing a suitable place to keep them, instead of having them lie about in odd corners.

Another good point is, that any one who does not feel in a position to go to the expense of buying a more complete assortment, can buy a five or seven size set, and from time to time add other sizes of Taps and Dies, thus making very little difference in the cost of the set when complete.

The cases furnished with these sets are nicely made and handsomely finished.

FRACTIONAL SIZE SETS.

Set No. 5 S, \$4.25, contains Stock, Tap-Wrench-Die, and 5 Dies and Taps, as follows:

Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Threads,	40	36	24	24	20

Set No. 6 S, \$5.50, contains Stock, Tap-Wrench-Die, and 7 Dies and Taps, as follows:

Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$
Threads,	48	40	40	36	24	24	20

Set No. 7 S, \$7.25, contains Stock, Tap-Wrench Die, and 10 Dies and Tap, as follows:

Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
Threads,	48	44	40	40	36	36
Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
Threads,	24	24	20	20	20	20

Set No. 8 S, \$10.00, contains Stock, Tap-Wrench-Die, and 15 Dies and Taps, as follows:

Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Threads,	72	60	48	44	40
Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Threads,	40	36	36	24	24
Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
Threads,	24	24	20	20	20

POSTAGE.

Any machine screw size of Tap or Die can be sent by mail for 2 cents. The postage on the full sets (including case) is as follows:

Nos.	1 S	2 S	3 S	4 S	5 S	6 S	7 S	8 S
	\$0.20	.24	.28	.35	.20	.24	.28	.35



FIG. 579.

We can furnish extra Dies and Taps of any of the sizes given in this list. The prices of the extra Dies will be found on page 144, and extra Taps on page 141.



FIG. 580. HOLDER FOR SMALL DIES.

The above holder is suitable for the No. 0 Dies ($\frac{1}{8}$ inch in diameter) and is about 7 inches long. 75 cents each; postage, 6 cents.

Extra cases only, for 10 sizes Taps and Dies, 50 cents; for 15 sizes, 65 cents.



FIG. 581. BIT BRACE DIES AND TAPS.

With these tools, threads can be cut with great rapidity, and they can be used in places where a Screw-Plate cannot; for instance on Clips, after they are shaped. Bolts can be dressed over if the threads have been bruised, without removing from place, etc.

Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Threads,	24	20	18	16	14
Each,	\$1.70	1.70	1.75	2.00	2.10

We send these with V thread $\frac{1}{4}$ over size, unless otherwise ordered; can furnish exact sizes or other threads if desired.

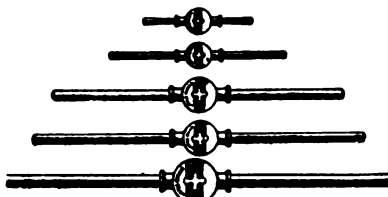
"FULL MOUNTED" SCREW PLATES.

FIG. 582.

We present herewith, a line of Screw-Plates, the style of which is comparatively new. Each size Die is mounted in a Stock by itself. This style of putting up Stocks and Dies originated with a Western manufacturer, we believe, some two or three years since, and, in our judgment, nothing so generally useful and convenient to the users of Stocks and Dies, has been brought out since the development of the Adjustable Die System.

While there are quite a number of minor advantages in this form of putting up these goods, there are two decided points of advantage which can be enlarged upon.

FIRST: In the regular style of Screw-Plates, the Stock which accompanies the set of Dies must be strong enough to suit the largest size Die in the set. For example, many sets are sold containing nine sizes of Dies, from $\frac{1}{4}$ to 1 inch. The Stock must be made strong enough to work the 1 inch Die, and a Stock of this size is entirely too heavy for sizes from $\frac{1}{4}$ to $\frac{3}{4}$ inch. Some manufacturers have partially overcome this objection, by furnishing, at the option of purchaser and at an added price, two Stocks (see No. 40, Fig. 586, and No. 9 and 12, Fig. 589). This, however, does not entirely overcome the difficulty, as a Stock that would be suitable in size for a $\frac{3}{4}$ inch Die, would be too large for a $\frac{1}{4}$ inch, and vice versa.

SECOND: With this improved style of Stocks and Dies, any—or all—of the sizes may be used at the same time. It is very often the case that two, or even more, men in a shop, want to thread bolts at the same time. With the ordinary Stock and Die, this is impossible, as when one party is using the Stock, the rest of the Dies must remain idle for want of a Stock; or, perhaps there is an outside job,

and the one who goes to do it has to take out the entire "Screw Cutting Department," which is not the case when he wants to take out one or two sizes from the full mounted Stock, there will be left all the other sizes ready for use. We are somewhat enthusiastic over this style of Plate, and believe it is destined to supersede very largely other forms of Screw-Plates now in general use.

No. 61, \$10.80, cuts $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ in.

" 65, 14.40, " $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ in.

" 67, 26.55, " $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.



FIG. 583. FULL MOUNTED PLATE.



FIG. 584.

COMPLETE SINGLE STOCKS.

An especially advantageous feature in connection with "full mounted" style of Plate, is the low price at which the single Stocks, Dies and Taps can be furnished. In the regular style "Lightning" and other Plates of this class, the smaller sizes cost very nearly as much to produce as the larger ones, the same Stock (or holder) being used for both the $\frac{1}{4}$ and 1 inch, and the $\frac{1}{4}$ inch Collet and Die costing nearly as much to make as the 1 inch, on account of there being about the same amount of labor and material in each. The following are the prices of the different sizes; these prices including the Stock, Guide, Die and Tap. All orders are filled with Taps and Dies $\frac{1}{16}$ of an inch over-size, unless otherwise ordered; can furnish them, if desired, with exact size of V, or U. S. Standard form of threads:

Size,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$ in.
Each,	\$1.75	1.80	2.00	2.25	2.60	3.00

Size,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	1 in.
Each,	\$3.25	3.60	3.95	4.50	5.00	6.00

LARGE SIZE SCREW-PLATES.



FIG. 585. NO. 30 SET.

The "Little Giant" form of die is especially well adapted for large sizes. The style of construction tends to make it more rigid and stronger than any other form of adjustable die known.

No. 20, \$29.75. Stock 40 inches long. Cuts $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, 1 , $1\frac{1}{2}$ and $1\frac{3}{4}$ inches.

No. 25, \$38.25. Stock 52 inches long. Cuts $\frac{1}{4}$, 1 , $1\frac{1}{2}$, $1\frac{3}{4}$ and $1\frac{1}{2}$ inches.

No. 30, \$31.85. Stock 52 inches long. Cuts $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$ and $1\frac{3}{4}$ inches.

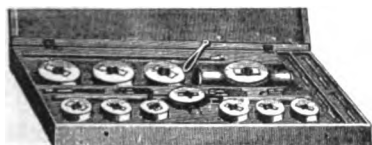


FIG. 586. NO. 40 SET.

No. 40, \$34.00. Has two stocks, one 25 inches long, fitting the first seven sizes, and one 40 inches long for the four largest sizes. Cuts $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, 1 , $1\frac{1}{2}$ and $1\frac{3}{4}$ inches.

J. M. CARPENTER'S SCREW-PLATES.



FIG. 587. FACE.



FIG. 588. BACK.

To those who prefer the regular style of Screw-Plate, having one stock (or two) fitting all the dies, we offer the J. M. Carpenter's Adjustable Die Stock, as being a superior tool. This stock is made similar to the original Reece Brothers' Stock, having an adjustable guide. (See cut, FIG. 588). It is compact, light and very

durable, besides being accurately and handsomely made.

All orders are filled with Taps and Dies $\frac{1}{4}$ oversize, unless otherwise ordered. Can furnish them, if desired, with exact size V or U. S. Standard Threads.



FIG. 589.

Set No. 6, \$9.00. Stock 15 inches long, with taps and dies cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch.

Set No. 7, \$10.15. Stock 15 inches long, with taps and dies cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

Dies used in sets Nos. 6 and 7 are the No. 2, page 144, $1\frac{1}{2}$ inches in diameter, and $\frac{1}{4}$ inch thick.

Set No. 8, \$12.00. Stock 23 inches long, with taps and dies cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

Dies used in Set No. 8 are the No. 3, page 145, 2 inches in diameter by $\frac{1}{4}$ thick.

Set No. 9, \$13.50. Two stocks, one 15 inches long, fitting first four sizes, and one 23 inches long for the three larger sizes. Complete with taps and dies, cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

Dies used in Set No. 9, in small stock, first four sizes No. 2; in large stock, three large sizes No. 3.

Set No. 10, \$16.50. Stock 29 inches long, with taps and dies cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

Set No. 11, \$13.15. Stock 29 inches long, with taps and dies cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and 1 inch.

Dies used in Sets Nos. 10 and 11 are the No. 4, page 145, $2\frac{1}{2}$ inches in diameter, and $\frac{1}{4}$ inch thick.

Set No. 12, \$20.65. Two stocks, one 15 inches long, fitting first five sizes, and one 29 inches long for the four larger sizes. Complete with taps and dies, cutting $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

Dies used in Set No. 12 in small stock, first five sizes No. 2; in large stock, four large sizes No. 4.

ADJUSTABLE TAP WRENCHES.

Tap wrenches are made in great variety, and yet, after all, there is not so very much difference between them. The first four shown, differ but little, as will be seen by comparing them.

The weak point of the Tap Wrenches shown in Figs. 590 to 594, is the zigzag shaped portion of the holding die. The larger the tap the smaller proportion of surface is held, the result being that the holding dies are weakest when opened out to receive the larger size taps.



FIG. 590. BILLINGS & SPENCER.



FIG. 591. LITTLE GIANT.



FIG. 592. GREEN RIVER.



FIG. 593. LIGHTNING.



FIG. 594. WELLS BROS.



FIG. 595. CHAMPION.



FIG. 596. PRATT & WHITNEY.



FIG. 597. ARMSTRONG.

We have sold at different times, all of the various styles shown, and almost as many more, not shown here, and have selected the following three styles as

embodying the best points, and as being most valuable for general use:



FIG. 598. CARD.



FIG. 599. MORSE.



FIG. 600. CARPENTER.

CARD'S TAP WRENCH.

No. 0, \$0.90; 5 inches long, fitting taps $\frac{1}{8}$ to $\frac{1}{2}$ inch.

No. 1, \$1.35; 8 inches long, fitting taps $\frac{1}{4}$ to $\frac{3}{4}$ inch.

No. 1 $\frac{1}{2}$, \$1.80; 10 inches long, fitting taps $\frac{1}{2}$ to 1 inch.

MORSE TAP WRENCH.

We think the best form of Tap Wrench for general purposes, is the style shown in Fig. 599, made by the Morse Twist Drill Company.

No. 0, \$1.45; 5 $\frac{1}{2}$ inches long, fitting taps $\frac{1}{8}$ to $\frac{1}{2}$ inch.

No. A, \$2.55; 13 inches long, fitting taps $\frac{1}{4}$ to $\frac{3}{4}$ inch.

No. B, \$3.40; 18 inches long, fitting taps $\frac{1}{2}$ to 1 inch; fitting reamers $\frac{1}{4}$ to 1 inch.

No. C, \$4.25; 23 inches long, fitting taps $\frac{3}{4}$ to 1 $\frac{1}{2}$ inches; fitting reamers $\frac{1}{2}$ to 1 $\frac{1}{2}$ inches.

No. D, \$12.75; 48 inches long, fitting taps 1 $\frac{1}{2}$ to 2 inches; fitting reamers 1 $\frac{1}{2}$ to 2 inches.

CARPENTER'S TAP WRENCH.

The Carpenter's Tap Wrench has holding dies similar in form to those in the Morse Tap Wrench. It is well made and a strong tool.

No. 1, \$1.75; 14 inches long, fitting taps $\frac{1}{4}$ to $\frac{3}{4}$ inch.

No. 2, \$2.75; 22 inches long, fitting taps $\frac{1}{2}$ to 1 inch.

New wrench for taps $\frac{1}{8}$ inch and smaller to 2 in.

TAPPING AND DRILLING
MACHINE.

This cut represents a Tapping Machine for manufacturers of Sewing machines, Fire-arms, Electric Lamps, Locks, Clocks, Hardware, etc.

FIG. 601.

This machine is self-reversing by pressing the work against the tap, and drawing it in the opposite direction when finished; check nuts on the end of spindle govern the depth to be tapped, when the tap is not required to pass through. The clutch is operated by gears running in the opposite direction. It is run by one belt, the cone pulley having two changes of speed. A universal chuck, holding from 0 to $\frac{1}{2}$ inch, is a part of the machine.

It can be used for drilling by attaching a lever to the foot-block spindle; the clutch held from reversing by a set screw. Price of machine, complete with Countershaft, \$60.00; Drilling Attachment, \$5.00 extra.

The Small Tapping Machine, Fig. 602, has been designed to meet the demand for a practical, low-priced tool, to do light work on electrical goods, light hardware specialties, etc.

The operation of this machine as shown in cut, is by means of a sliding clutch, which, when work is brought against tap, engages with clutch on end of shaft, on which tight and loose pulleys are shown, making practically a solid spindle which drives the tap into the work.

The reverse motion is operated by the gearing, and it will be observed that the

only work the gears have, is the comparatively light duty of reversing the tap after the work has been done.

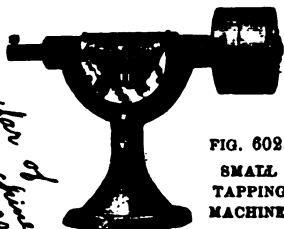


FIG. 602.

SMALL
TAPPING
MACHINE.

The capacity of this tool is from the smallest size up to about a $\frac{1}{16}$ inch hole in iron and a $\frac{1}{8}$ inch hole in brass.

Price of machine, as shown, \$15.00; price of machine, without Driving Pulleys, arranged to be driven from chuck in lathe, \$12.00.

HAND AND POWER BOLT CUTTERS.

On this and the following page we present a line of "Little Giant" Bolt Cutters and Nut Tappers made by Wells Brothers. These machines are convenient, and we think the best style for general use in blacksmith and machine shop.

All machines are furnished with V form of threads. Taps and Dies sent $\frac{1}{4}$ of an inch oversize, unless otherwise ordered; U. S. Standard or Whitworth form of threads can be furnished at the same price.

We can also furnish these machines with solid Dies and Collets, in place of the adjustable dies; or machines only, without Taps, Dies, Collets, Tap Chuck or Countershaft. Prices for same furnished upon application.

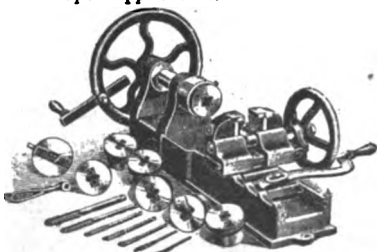


FIG. 603. NO. 6 BOLT CUTTER.

No. 6, \$45.00. Complete with Tap Chuck, Taps, Dies and Collets, cutting $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, 1 , $1\frac{1}{8}$ and $1\frac{1}{4}$ inch.

HAND MACHINES.

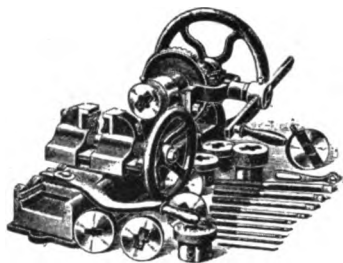
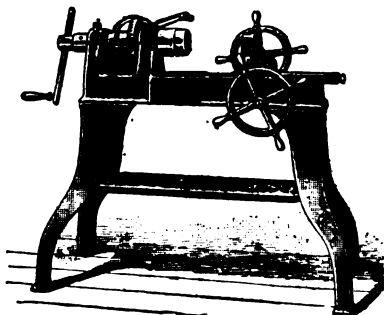


FIG. 604. NO. 7 BOLT CUTTER.

No. 7, \$63.00, complete with Tap Chuck, Taps, Dies, and Collets, cutting $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ and 1 inch. This machine has an improved Clutch on Spindle for running die off after thread is cut, making a quick return.

FIG. 605. NOS. 8 AND $8\frac{1}{2}$ BOLT CUTTERS.

No. 8, \$81.00, has the same assortment of Taps and Dies as given in the No. 7. This machine has three changes of speed, multiplying the power two and seven times, and equalizing it once.

No. $8\frac{1}{2}$, \$97.20, cuts same sizes as No. 7, with the addition of $1\frac{1}{8}$ and $1\frac{1}{4}$ inch. Balance wheel furnished on end of Spindle for \$5.00 extra.

No. 9, \$126.00, complete with Tap Chuck, Taps, Dies, and Collets, cutting $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, and $1\frac{3}{4}$ inch. Balance wheel furnished on end of Spindle for \$5.00 extra. This machine has four changes of speed, also clutch on Spindle for throwing out gear; has hollow Spindle and is capable of a great variety of work.

POWER MACHINES.

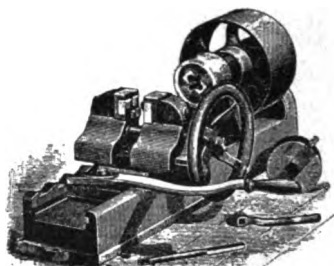


FIG. 606. NO. 0 POWER.

The above cut shows small Power Bolt Cutter and Nut Tapper arranged for bench. It is a convenient machine, suitable for all sizes up to $\frac{1}{2}$ inch.

No. 0, \$25.00, without Taps, Dies, Collets or Tap Chuck.

Will name prices upon application, for Taps, Dies and Collets suitable for this machine.

No. 10, \$103.50. This machine has the same assortment of sizes as the No. 7 machine, Fig. 604. The price includes plain countershaft; if with Friction Clutch, \$9.00 extra.

No. $10\frac{1}{2}$, \$120.00. This machine has the same assortment of sizes as the No. $8\frac{1}{2}$ hand machine. The price includes plain countershaft; if with Friction Clutch, \$9.00 extra.

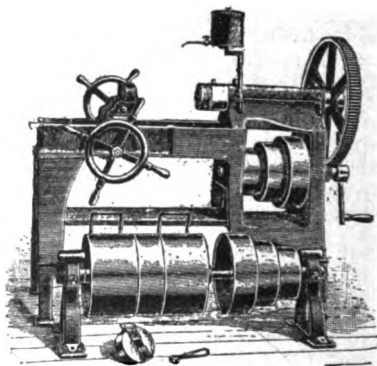


FIG. 607. NO. 12, FOR POWER.

No. 12, \$148.50. This machine has the same assortment of sizes as the No. 9. Hand power, Price includes plain countershaft; if with Friction Clutch, \$9.00 extra.

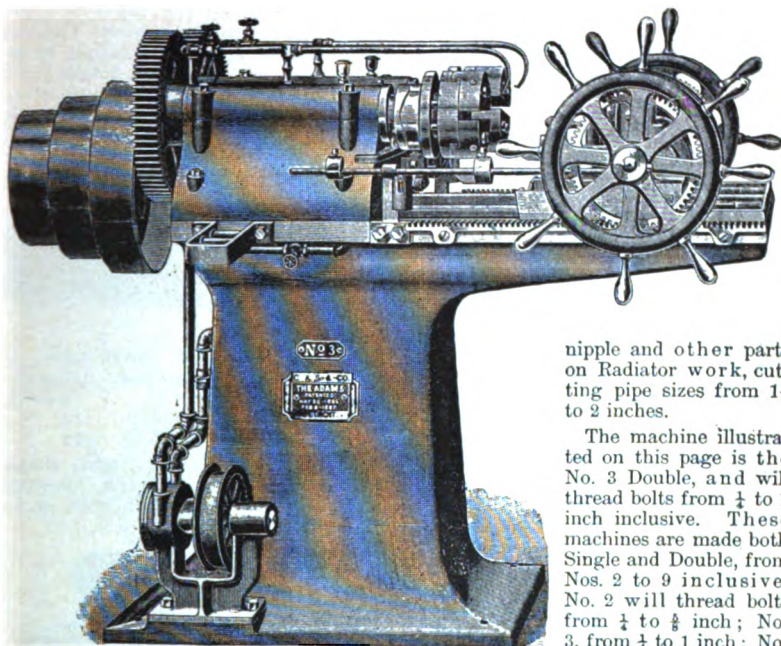


FIG. 607.A.

**THE ADAMS AUTOMATIC BOLT THREADING
AND NUT TAPPING MACHINE.**

We have sold these machines for the past four years, and consider them as being the best Automatic Bolt Threading Machines now in the Market. Are simple, strong and durable, the head consisting of four parts only, there being no links, levers, springs, caps, cases, blocks, or die rings.

The automatic arrangement for opening and closing the head is positive in its operation and simple in its construction; does not require any attention of the operator, after the length of thread to be cut is adjusted by the opening collar on the rod, attached to the sliding carriage. Its capacity is only limited by the skill of the operator.

Out of the machines sold by us there are twenty-six in constant use in our vicinity, and we have never heard a single complaint. Have sold six or eight of these machines especially rigged up for

nipple and other parts on Radiator work, cutting pipe sizes from $\frac{1}{2}$ to 2 inches.

The machine illustrated on this page is the No. 3 Double, and will thread bolts from $\frac{1}{2}$ to 1 inch inclusive. These machines are made both Single and Double, from Nos. 2 to 9 inclusive. No. 2 will thread bolts from $\frac{1}{2}$ to $\frac{3}{4}$ inch; No. 3, from $\frac{1}{2}$ to 1 inch; No.

4, from $\frac{3}{4}$ to 1 $\frac{1}{2}$ inches; No. 5, from $\frac{1}{2}$ to 2 inches; No. 6, from $\frac{3}{4}$ to 2 $\frac{1}{2}$ inches; No. 7, from $\frac{3}{4}$ to 3 inches; No. 8, from 1 to 3 $\frac{1}{2}$ inches; No. 9, from 1 to 4 inches.

Can furnish separate heads and dies, complete with automatic device for opening and closing the dies, suitable for applying or attaching to other machines. These are supplied at a very moderate price, and by the use of these separate heads and dies, an old machine may be transformed into a more modern tool.

The manufacturers of this line of bolt cutting machines also make an Automatic Rod and Bicycle Spoke Threading Machine, which can be used for threading rods up to $\frac{3}{4}$ inch diameter, and a Patent Automatic Nut Tapping Machine of unsurpassed capacity and labor-saving qualities.

We will gladly mail to any address, upon application, a sixty-two page catalogue containing illustrations, full descriptive matter and prices on this class of machinery.

PIN AND HAND VISES.



FIG. 608. No. 762.

This is a small Pin Vise; hollow through
Nickel plated, each, \$0.35;
postage, 5 cts.



FIG. 609.



FIG. 610.



FIG. 611.

The Lowell Pin Vise, Fig. 610, is a
light, handsome tool, $4\frac{1}{2}$ inches long, and
can only be recommended for light work.
Each, \$1.35; postage, 5 cts.

The Hand Vise, Fig. 611, is same style
as Fig. 610, but a much heavier tool; is
 $5\frac{1}{2}$ inches long and especially desirable for
machinists. Each, \$1.85; postage, 10
cents.

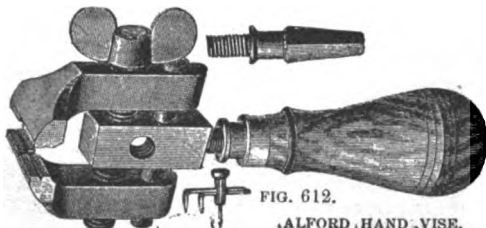


FIG. 612.

ALFORD HAND VISE.

The Alford Hand Vise, Fig. 612, is one
of the most popular tools we sell. The jaws
open parallel. It is finely finished, Nickel
plated and has Rosewood handle: this
is hollow to hold small attachments which
go with it; measures $6\frac{1}{4}$ inches over all.
Price, \$1.60. Postage, 20 cents.

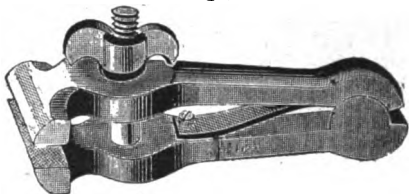


FIG. 613. No. 747. HAND VISE.

	Black.	Nickel Plated.	Postage.
3 inch,	\$0.60	\$0.85	8 cents.
4 " "	.75	1.00	10 " "
5 " "	.85	1.20	12 " "

We can also furnish the same Hand
Vise as shown in Fig. 613, with Rosewood
handle, in the 3 and 4 inch sizes, at an
additional cost of 25 cents each.

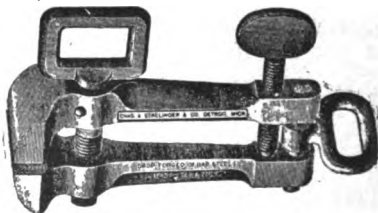


FIG. 614. BILLINGS HAND VISE.

The Billings' Hand Vise is drop-forged
from solid bar steel.

The jaws are parallel, which gives them
a very strong grip, an opening being left
in the thumb-screw head for extra pur-
chase with lever, if wanted, and the
action of the screw is such that the ad-
justment is very rapid. It is
also provided with a thumb-
screw at the lower end of bar;
to give extra grip to jaws
when required. Is superior to
English and German goods.

Adapted for Machinists,
Tool-makers and Electric line-
men. Is 6 inches long.

Vise with Loop (See cut)
each, \$2.50; without Loop, for
Machinists, each, \$3.25.

VICTOR JEWELERS' VISES.

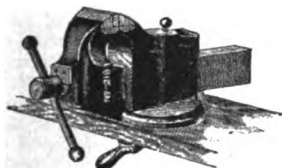
The "Victor" Jewelers' Vises are made after the same style and pattern as the "Victor" Machinists' Vises on page 163.

No.	Price.	Width of Jaws, in.	Opens in.	Weight lbs.
2	\$0.25	1½	1½	1½
2½	.45	1¾	2	2½
3	.65	2	2½	4
4	1.15	2½	2¾	9

**FIG. 615. FLAT BOTTOM.**

No. 316, \$3.00, Jaws 1½ inches wide, opens 2 inches. Same polished and nickel plated, \$4.90.

No. 318, \$3.40, Jaws 2½ inches wide, opens 2½ inches. Same polished and nickel plated, \$5.50.

**FIG. 616. SWIVEL BOTTOM.**

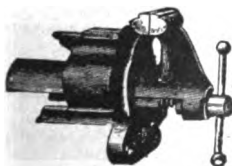
No. 216, \$3.80, Jaws 1½ inches wide, opens 2 inches. Same polished and nickel plated, \$5.75.

No. 218, \$4.25, Jaws 2½ inches wide, opens 2½ inches. Same polished and nickel plated, \$6.35.

AMATEUR VISES.

Under this heading we classify a line of small and medium sized Vises that we sell largely to locksmiths, key fitters, model makers, and to those desiring a fairly substantial tool at a low price.

These Vises are made of cast iron and nicely finished; they are not made with steel jaws; in the sizes 2 inch and larger, the jaws are chilled; are the best goods of their class.

**FIG. 617. NO. 2 AMATEUR VISE.****FIG. 618. CLAMP VISE.**

No.	Price.	Width of Jaws, in.	Opens in.	Weight lbs.
2½	\$0.35	1½	1½	1½
2¾	.55	1¾	2	2½
3½	.85	2	2½	4½
4½	1.25	2½	2¾	9½

**FIG. 619. GIPSY VISE.**

A strong, cheap Vise for common use. It is made of good material, with Steel Screw and Welded Steel Jaws milled and cut; is strong and convenient. Head of swivel screw allows operator to move jaw in or out, or to any desired angle and fasten in position.

The nut is made with long full thread cut in solid metal of back jaw.

No. 65, \$1.50, 2½ inch jaws, opens 3 inch.

" 66 2.00, 3½ " " " 4 "

" 67 3.50, 4 " " " 6 "

No. 65, weighs 8 lbs.; No. 66, weighs 14 lbs.; and No. 67, weighs 28 lbs.

VISES.

There are few tools in a shop that are more generally useful and used, than the vise; and yet, of all the tools bought, we know of none that purchasers display so little judgment and discretion in buying. The man who would not look at a Milling Cutter that did not have Brown & Sharpe stamped on it, or hardly any tool that was not of some standard make, will buy the first Vise he comes across if the price is low and if the face of the jaw is of a certain width. This, regardless of the fact, that a good Vise like any good tool, costs more than a poor one, and that the maker of a properly proportioned four inch Vise can take the same patterns, and with but little change make an improperly proportioned five inch Vise, at an extra cost of 15 or 20 cents.

Every one around the shop uses and abuses the Vise. In purchasing Vises, it is well to select one that is amply strong, as the extra service will fully compensate for the additional first cost.

In Vises there is an almost endless variety of styles to select from. We jot down (from memory) the names of makers of Vises which we have used or sold at times:

Chas. Parker Co.	Prentiss Vise Co.
Athol Machine Co.	Millers Falls Co.
Howard Iron Works.	Trenton Vise Co.
Massey Vise Co.	Meadville Vise Co.
Stephens' Vise Co.	Armstead O. Bills.
Wyman & Gordon.	Hollandk Mfg. Co.
Barnes Mfg. Co.	Merrill Bros.
Bonney Vise Co.	Fisher & Norris.

The four or five concerns at the head of this list are the most widely known, and

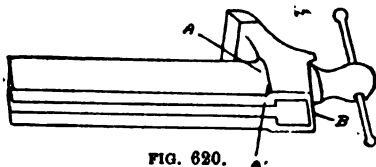


FIG. 620.

probably their production is double that of the others combined.

We give preference to the Parker Vises; they are one of the oldest—if not the oldest—makers, and their product has always given satisfaction. This company makes thirty-four styles in one hundred and fourteen sizes.

The weakest part of all Vises is the front Jaw, which, when it gives way, almost invariably breaks at, or about point marked A A; these cuts were made

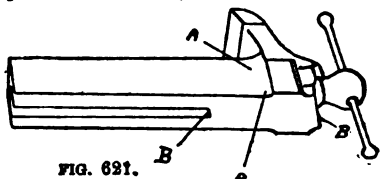


FIG. 621.

from vise jaws $4\frac{1}{2}$ inches wide. From B to B the Parker Vise is for $5\frac{1}{2}$ inches nearly a solid column, while the other is open the entire length.

The sketch, Fig. 621, represents the construction of the Front or Sliding Jaw used in the Parker Vise.

Fig. 620, shows the style of Jaw used in nearly all of the other leading makes.

A 5 inch jaw Parker Vise, weighs 80 pounds; most other Vises of the same width of jaw weigh from 64 to 66 pounds. The Parker Jaws are made of Jessop's tool steel, and dove-tailed, and can be readily replaced if necessary; most other Vises have steel Jaws cast on.

The Victor Machinists', Jewelers' and Woodworkers' Vises take the place with us of the Prentiss Vises, shown in our former catalogue, and combine the advantageous features mentioned above. The greater proportion of Vises used in our shops are the Nos. 2100 to 2400, Fig. 623. We consider the Swivel Base more essential than the Swivel Jaw, although it is well to have a proportion of the latter in a shop for Special or Taper work.

An experience of twenty-five years has given us ample opportunities to judge of the comparative durability of the different makes of vises, and in this respect we found nothing equal to the Parker Vises.

"QUICK ACTING" VISES.

This refers to a Vise, in which the movement of a lever releases the jaw, so that it can be moved in or out its full length instantly. There are a number of different kinds: Stephens's, Hall's, "Sudden Grip," Massey "Perfect," Massey "Lightning Grip," Prentiss "Rapid Transit," and two or three others.

* See "Lightning Grip" Vise, illustrated and described on page 164.

PARKER'S MACHINISTS' VISES.

The first two vises shown and described here represent our standard line, they are first-class in all respects and are moderate in price.

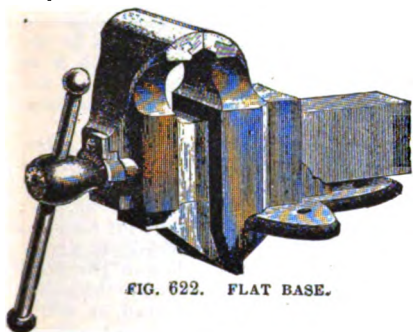
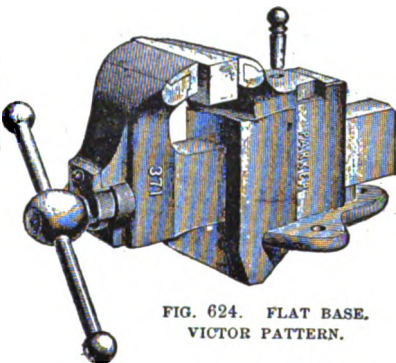


FIG. 622. FLAT BASE.

No.	Each.	Width of Jaws.	Weight.
0000	\$4.40	3½ in.	23 lbs.
100	5.20	3½ "	32 "
200	6.80	4½ "	49 "
300	8.60	4½ "	60 "
400	12.80	5½ "	83 "
500	19.00	6½ "	120 "
600	36.00	8½ "	240 "

They are in general style quite similar to the Prentiss Vise, which is very widely known. We sell about three of the Flat Base vises to one of the Swivel Base.

These Vises have self-adjusting back jaws, which automatically adapt them-

FIG. 624. FLAT BASE.
VICTOR PATTERN.

selves for holding beveled or wedge-shaped pieces. The steel faces are milled and fitted to the jaws, and can be renewed at small cost.

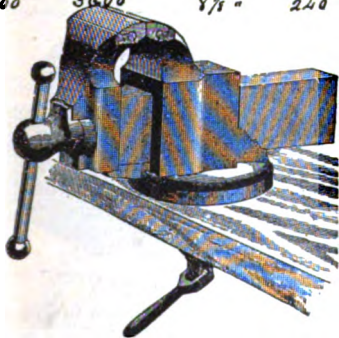


FIG. 623. SWIVEL BASE.

No.	Each.	Width of Jaws.	Weight.
2000	\$3.30	2½ in.	8½ lbs.
2100	5.00	3½ "	23 "
2200	6.40	3½ "	35 "
2300	8.00	4½ "	48 "
2400	10.60	4½ "	64 "
160	40.00	8½ "	250 "

PARKER'S VICTOR MACHINISTS' VISES.

The Victor Vises, Figs. 624 and 625, are of the type most generally sold to, and used by, Machinists and Tool-makers.

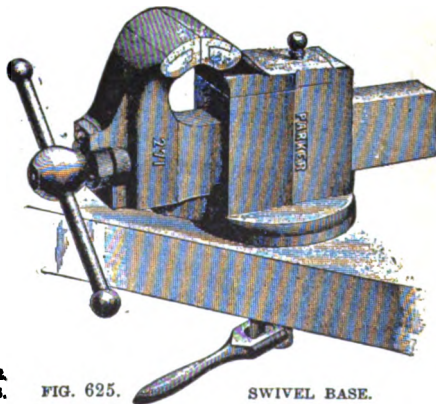


FIG. 625. SWIVEL BASE.

FLAT BASE.				SWIVEL BASE.			
No.	Each.	Wt lbs.	Width Jaws, in.	No.	Each.	Wt lbs.	
370	\$5.20	25	3½	270	\$5.60	20	
371	5.60	39	3½	271	6.80	42	
372	8.40	57	4½	272	10.00	60	
373	11.20	73	5	273	12.80	77	
374	13.60	98	5½	274	15.20	110	
375	19.20	150	6½	275	21.60	165	
340	27.20	185	7½	240	29.75	200	

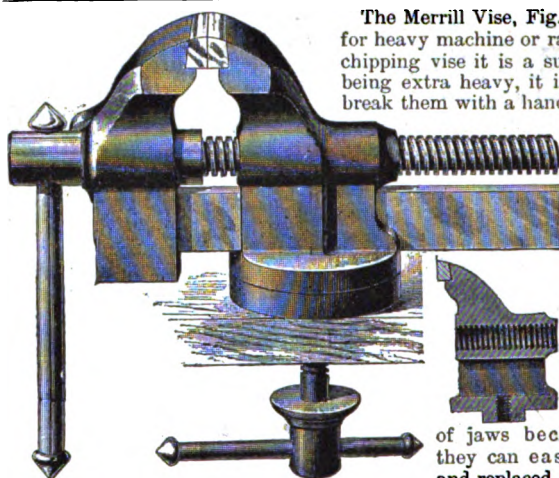


FIG. 626.

MERRILL'S PARALLEL SWIVEL VISE.

Width of Jaw.	Each.	Opens.	Weight	Diameter of Screw.	Size of Bar.
5	\$12.35	9 inches.	80 lbs.	1 1/4 inches.	1 1/2 x 2 1/2 inches.
6 1/2	16.15	10 "	125 "	1 1/2 "	1 1/2 x 3 1/2 "
8	20.90	12 "	165 "	1 3/4 "	1 1/2 x 4 "

FIG. 627.

WROUGHT IRON
SOLID BOX VISES.

No.	Each.	Width of Jaw, Inches.
40	\$5.25	4
45	5.50	4 1/2
50	6.25	4 3/4
55	6.60	4 1/2
60	7.15	5
70	8.25	5 1/2
80	9.60	5 3/4
90	11.00	5 1/2
100	12.10	6
110	13.20	6 1/2
120	14.30	6 3/4
130	15.95	6 1/2
140	18.15	7
150	19.80	7
160	22.85	7 1/2
180	25.85	7 1/2

The numbers represent weight.

The Wrought Iron Solid Box Vises are strong and durable, and answer well for rough work; are sold largely to blacksmiths and wagon makers. They are made entirely from wrought iron.

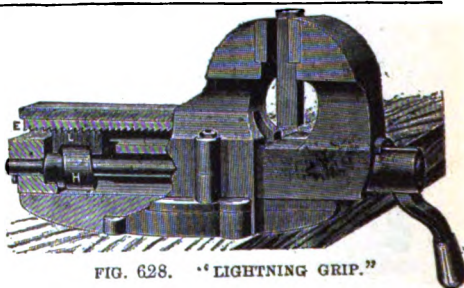


FIG. 628. "LIGHTNING GRIP."

In the style of Vise shown in Fig. 628, the moveable jaw can be instantly adjusted and the work firmly fastened with a quarter turn of the handle.

We consider the Massey "Lightning Grip" Vise, Fig. 628, the most convenient and desirable of this class.

No. 10, \$5.60, 1 1/4 inch jaws; opens 4 in.
 " 11, 7.65, 3 1/4 " " " 5 "
 " 12, 10.28, 4 1/4 " " " 6 "

There are four larger sizes of this style of Vise made, but we do not think a quick-acting Vise is especially desirable, except in the smaller sizes.



FIG. 629.

PORTABLE PARALLEL VISE.

Price, \$31.50; width of jaws, $5\frac{1}{2}$ inches; weight of vise, 300 pounds; has a bench, with tool drawer attached. Each vise has an extra pair of pipe jaws for cutting and threading pipe. For Machine shops, Rolling mills, Furnaces, Contractors, and Mines, it is invaluable in saving time.

WOOD-WORKERS' VISES.

These Vises are designed for the use of Carpenters, Cabinet-makers, Pattern-makers, and Wood-workers generally.

The "Victor" Vises have the swivel self-adjusting back jaws, which automatically adapt themselves for holding wedge-shaped pieces.

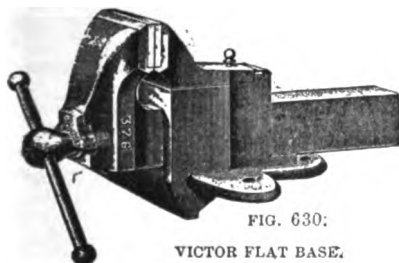


FIG. 630:

VICTOR FLAT BASE.

No.	Each.	Jaws.	Weight.
376,	\$6.80,	4 inches, opens $7\frac{1}{2}$ in.,	40 lbs.
377,	9.35,	$4\frac{1}{2}$ " " $9\frac{1}{2}$ " 59 "	

[U]

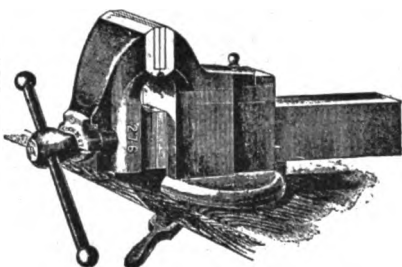


FIG. 631. VICTOR SWIVEL BASE.

No.	Each.	Jaws.	Weight.
276,	\$8.10,	4 inches, opens $7\frac{1}{2}$ in.,	40 lbs.
277,	11.05,	$4\frac{1}{2}$ " " $9\frac{1}{2}$ " 65 "	

The type of Wood-workers' Vises, represented by Figs. 632 and 633, are coming into very general use. A very large percentage of the work done by pattern and cabinet-makers, and wood-workers generally, can be handled better in this style of vise than in any other. In the better class of shops they are taking the place of the bench-screw and other styles of wood-workers' vises. The jaws are flush with top of bench.

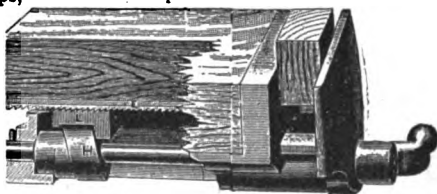


FIG. 632.

LIGHTNING GRIP WOOD-WORKER'S VISE.

No.	Each.	Jaws.
17,	\$6.00,	9 inches wide, opens 12 inches,
17 $\frac{1}{2}$,	9.25,	14 " " " 12 "

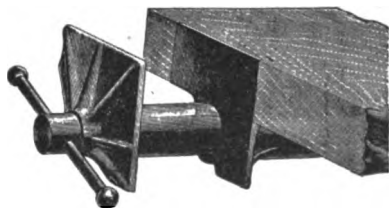


FIG. 633. THE FAIRBAIRN VISE.

Price, \$6.50. Jaws are planed true and smooth, and screw is entirely inclosed. Width of jaws, 9 inches; opens 12 inches.

LATHE AND CLAMP DOGS.

The line of Lathe and Clamp Dogs made by C. W. LeCount, are first-class in every respect, strong and well proportioned. The screws are of steel, lathe made and tempered, and perfectly fitted with full U. S. Standard thread.

During the past few years, several concerns have made imitations of these goods. All the imitations that we have seen are inferior in stock and workmanship, fitted with ordinary case-hardened iron screws, and are not worth one-half the price of the genuine.



FIG. 634. LECOUNT'S HEAVY STEEL DOG.

This Dog has a very heavy Boss, so that if the thread wears, a heavier screw can be substituted.

No.	Each.	Takes inches.	No.	Each.	Takes inches.
1	\$0.28	$\frac{1}{8}$	12	\$0.84	2
2	.35	$\frac{1}{4}$	13	.95	2 $\frac{1}{2}$
3	.42	$\frac{3}{8}$	14	1.05	2 $\frac{3}{4}$
4	.43	$\frac{1}{2}$	15	1.13	3
5	.49	$\frac{5}{8}$	16	1.25	3 $\frac{1}{2}$
6	.52	1	17	1.47	4
7	.56	1 $\frac{1}{4}$	18	1.95	4 $\frac{1}{2}$
8	.60	1 $\frac{1}{2}$	19	2.25	5
9	.67	1 $\frac{3}{4}$	21	3.50	6
10	.70	1 $\frac{7}{8}$	22	4.20	7
11	.77	1 $\frac{1}{2}$	23	4.90	8



FIG. 635. LECOUNT'S LIGHT STEEL DOG.

These dogs are most desirable for light work.

FIG. 636. AMATEUR LATHE DOG.



Nos.	1	2	3	4
Each,	\$0.25	.30	.40	.45
Takes,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	1 in.



FIG. 637. LECOUNT'S STRAIGHT TAIL DOG.

This pattern will stand more than a bent tail, some prefer them on account of their direct action on the work. Are the same pattern as the Heavy Steel Dog, and warranted, like that, not to break with any lathe work.

Are made in sizes from $\frac{1}{4}$ to 5 inches, and are the same in price as the Heavy Steel Dog, Fig. 634.



FIG. 638. STEEL DOG WRENCH.

Fitting screw heads from $\frac{1}{4}$ to $\frac{3}{4}$ inch square. Will answer for both Dogs and Tool Post. Price, 75 cents.



FIG. 639. DROP-FORGED STEEL LATHE DOG.

These Dogs are drop-forged from mild steel, which gives the greatest strength and toughness of material for the least weight, while they are also heavier than Dogs of corresponding sizes made elsewhere.

The cross section is shaped similarly to an ogee, forming a rib on the back, by which the metal is utilized to its greatest advantage at the point of severest strain;

the screws are made of steel to U. S. gauge, with hardened points, and are from one-sixteenth to one-eighth of an inch larger in diameter than those generally used in lathe dogs.

Size,	$\frac{1}{4}$ in.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Each,	\$0.45	.54	.63	.72	.85	1.00
Size,	$1\frac{1}{4}$ in.	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Each,	\$1.13	1.25	1.44	1.62	1.80	2.05

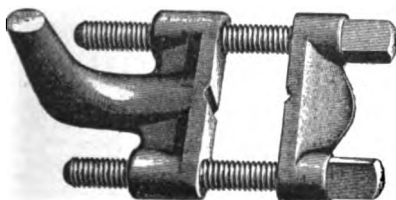
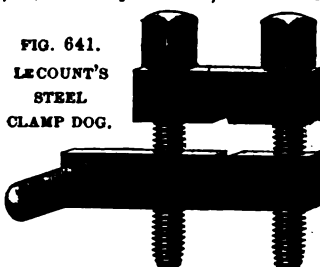


FIG. 640. LECOUNT'S CLAMP DOG.

Used for finished work and many other purposes; sometimes called "Bitch Dog." They are made of malleable iron.

No.	Each.	Opens.	No.	Each.	Opens.
1,	\$0.90	1 in.	3,	\$1.15	2 in.
2,	1.00	$1\frac{1}{2}$ "	4,	1.45	3 "



These Clamps are made from the steel bar. They will carry all that can be put into them.

No.	Each.	Opens.	No.	Each.	Opens.
1,	\$1.12	1 in.	3,	\$1.60	2 in.
2,	1.35	$1\frac{1}{2}$ "	4,	1.80	3 "



FIG. 642. BILLINGS C CLAMP.

The Billings C Clamp Fig. 642 is made of drop forged steel, extra heavy.

No.	Each.	Opens.	Weight.
1	\$1.00	$1\frac{1}{2}$ in.	5 oz.
2	2.00	$2\frac{1}{2}$ "	2 lbs.
3	2.50	$3\frac{1}{2}$ "	$5\frac{1}{2}$ "
4	3.25	$4\frac{1}{2}$ "	7 $\frac{1}{2}$ "
5	4.00	$6\frac{1}{2}$ "	$11\frac{1}{2}$ "

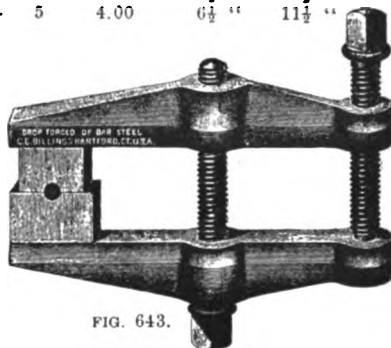


FIG. 643.

DROP FORGED MACHINIST CLAMP.

The Drop Forged Machinist's Clamp Fig. 643, is very much superior to the ordinary clamp of this type usually made in shops. The shop-made clamp is necessarily weak at the point where the screws pass through the bars. These Clamps are strongly reinforced at this point, and will remain square and true through the hardest kind of usage.

No.	1	2	3
Each,	\$1.50	2.00	2.50
Opens	$1\frac{1}{2}$ in.	$2\frac{1}{2}$ in.	$3\frac{1}{2}$ in.

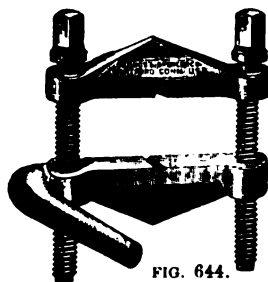


FIG. 644.

BILLINGS' DROP FORGED CLAMP DOG.

No.	1	2	3
Each,	\$1.35	1.80	2.25
Opens	$1\frac{1}{2}$ in.	$2\frac{1}{2}$ in.	$2\frac{1}{2}$ in.

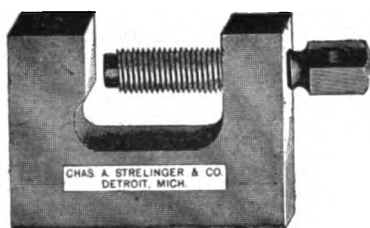


FIG. 645.

BESLY'S PARALLEL CLAMP.

The Parallel Clamp, Fig. 645, is comparatively new; made of steel (hardened). All surfaces are parallel and at right angles to each other, which is very desirable in clamping work to be drilled in the drill press. It is the only tool of this kind on the market, and can be made useful for general purposes.

Opens.	Each.	Wght.	Opens.	Each.	Wght.
1½ in.	\$1.00	8 oz.	4 in.	\$3.00	5 lbs.
1½ "	1.25	9 "	5 "	5.00	11½ "
2 "	1.75	1½ lbs.	6 "	6.00	11½ "
3 "	2.00	2 "			

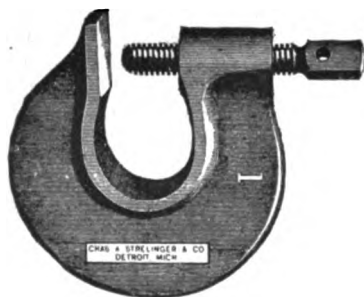


FIG. 646.

EXTRA HEAVY STEEL BOILER CLAMP.

The screws have square threads; are large and well fitted. They run down to the foot and are hard on the point.

No. 1, \$2.70, 2 in.	No. 4, \$5.40, 5 in.
" 2, 3.60, 3 "	" 5, 6.75, 6 "
" 3, 4.50, 4 "	" 6, 9.00, 10 "

We can also furnish what is known as a Light Steel Boiler Clamp, of the same general style as the other, and heavy enough for most purposes. It is made in two sizes.

No. 0, \$1.80; opens 2½ inches.
" 1, 3.60; " 4 "

HAND SOREWS.

The Hand Screws made by R. Bliss Mfg Co. have been the standard as far as excellence of quality is concerned, for the past thirty years or more, and they are almost universally used in the leading cabinet shops throughout the country. The majority of organ and piano manufacturers will use no other, notwithstanding that they are from ten to fifty per cent higher in price than any other make.

Many of our customers use a paste, or mixture, made of Graphite (black lead) and tallow, which they apply to the screws when they are received new in the shop. This not only makes them work easier, but adds considerably to their length of service.

We print here the line of sizes we carry in stock; can furnish larger as well as intermediate sizes.

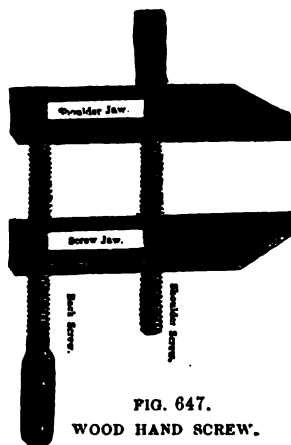


FIG. 647.

WOOD HAND SCREW.

No.	Price, Dozen.	Price, Each.	Diam. Screw.	Length of Jaw.	Opens
2	\$7.20	\$0.70	1½ in.	20 in.	13 in
5	6.30	.60	1½ "	18 "	11 "
7	5.65	.55	1 "	16 "	9 "
10	4.50	.45	¾ "	14 "	8 "
11	3.60	.35	¾ "	12 "	7 "
12	3.15	.30	¾ "	10 "	5 "
14	2.00	.20	¾ "	7 "	4 "
15	1.65	.17	¾ "	4 "	2 "

The Bliss Co. make a complete line of piano and cabinet-makers' clamps. Sizes and prices upon application.

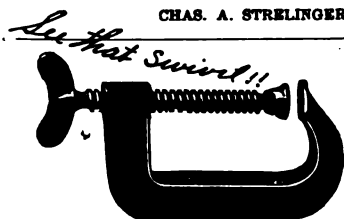


FIG. 648. EAGLE CABINET CLAMP.

Eagle Cabinet Clamps are made with swivel head on end of screw, and frames are ribbed around the side. We think they are the best made and strongest Malleable Clamp in the market.

Size,	2	3	4	5	6 in.
Doz.	\$1.35	2.15	3.00	3.50	4.55
Each,	.15	.29	.30	.35	.45
Size,	7	8	10	12	in.
Doz.	\$5.50	6.30	7.75	9.50	
Each,	.55	.65	.80	.95	



FIG. 649. SNOW'S ADJUSTABLE CLAMP.

This Clamp is generally conceded to be the best one of the quick-adjusting type.

Size,	2	3	4	5 in.
Doz.	\$5.05	5.85	6.50	7.35
Each,	.46	.53	.60	.67
Size,	6	7	8	inch.
Doz.	\$9.80	11.00	13.50	
Each,	.90	1.00	1.25	



FIG. 650. BOSTON MITRE CLAMP (OPEN)



FIG. 651. BOSTON MITRE CLAMP (CLOSED).

The Boston Mitre Clamp, Figs. 650 and 651, is used by cabinet and picture frame makers. Price, each, 65 cents.

LECOUNT'S HEAVY STEEL CLAMP.

These are made extra heavy with button on end of screw, hung on a ball, so as to accommodate itself to irregularities without bending the screw. The foot of the Clamp is planed, and the back of Clamp is $2\frac{1}{2}$ inches from centre of screw.

The screws of all these Clamps are made to reach the lower number, for example: No. 6 Clamp, which opens to 8 inches, will take anything from 6 (the number of Clamp) to 8 inches.

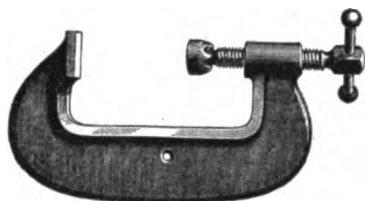


FIG. 652.

No.	Each.	opens to
No. 1	\$1.60	2 inches.
" 2	1.80	" 3 "
" 3	2.00	" 4 "
" 4	2.25	" 5 "
" 5	2.50	" 6 "
" 6	2.90	" 8 "
" 7	3.35	" 10 "
" 8	3.85	" 12 "
" 9	4.50	" 14 "
" 10	5.40	" 16 "
" 11	6.30	" 18 "
" 12	10.80	" 24 "
" 13	14.40	" 30 "

NO NAME FOLKS.—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name. If it is an order from him with money enclosed, we are pretty sure to hear from him, wanting to know where the goods are—and sometimes the letters are not overly civil; if it is a letter of inquiry and our correspondent gets no answer, he thinks we are inattentive or careless, and as a result, we are apt to lose what might be a good customer.

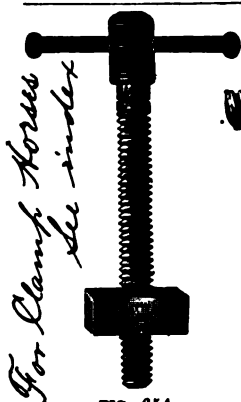


FIG. 654.
WOOD BENCH
SCREW.

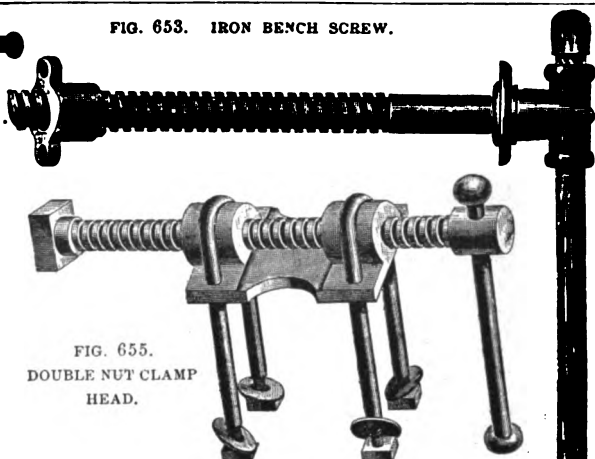


FIG. 653. IRON BENCH SCREW.

FIG. 655.
DOUBLE NUT CLAMP
HEAD.



FIG. 656. MANUFACTURERS' AND BUILDERS' STEEL BAR CLAMP.



FIG. 657. PIANO-MAKERS' CLAMP.

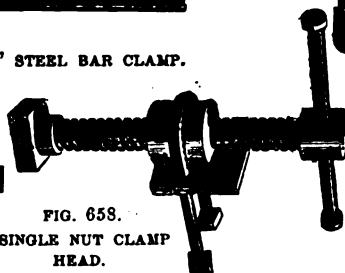


FIG. 658.
SINGLE NUT CLAMP
HEAD.



FIG. 659. CARPENTERS' DOOR CLAMP.

BENCH SCREWS AND CLAMPS.

Fig. 653 shows the regular Wrought Iron Bench Screw. The ordinary length is fifteen inches. We carry sizes as per list.

Diam.	Each.	Lgth.	Diam.	Each.	Lgth.
1	\$0.40	15	1½	\$0.60	15
1	0.90	20	1½	1.15	20
1	1.10	24	1½	1.50	24
1½	0.50	15	1½	0.90	15
1½	1.00	20	1½	1.80	20
1½	1.25	24	1½	2.35	24

WOOD BENCH SCREWS. FIG. 654.

We have the Wood Bench Screws both in maple and hickory. The maple bench screws are of good quality, and similar to those usually found in hardware stores.

Diameter,	2 in.	2½ in.	2½ in.
Each,	\$0.30	0.40	0.50

Our Hickory Bench Screws are made by the R. Bliss Mfg. Co., and the finest quality second growth hickory is used.

Diam.,	1½ in.	1½	2	2½	2½
Each.	\$0.40	0.45	0.55	0.65	0.75

COLT'S SCREW CLAMPS.

This Clamp has been on the market for several years, and has met with a constantly increasing demand from cabinet-makers and builders. They are used largely by sash, door and blind manufacturers.

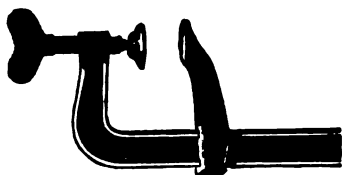


FIG. 660.

COLT'S ECCENTRIC CLAMPS.

The Eccentric Clamp is generally preferred to the screw clamp, and we sell perhaps five to one of this kind. Twelve inch size and upwards are different in form from cut, being heavier and stronger.



FIG. 661.

PRICES OF SCREW AND ECCENTRIC CLAMPS.

No.	Opens.	Each.	Per doz.
No. 1	4 inches.	\$0.38	\$3.60
" 2	6 "	0.50	4.95
" 3	8 "	0.60	6.30
" 4	12 "	0.75	7.65
" 6	15 "	0.85	8.70
" 7	18 "	0.90	9.30
" 9	24 "	1.10	10.80
" 10	30 "	1.20	12.15
" 11	36 "	1.35	13.50
" 13	48 "	1.60	16.20
" 15	60 "	1.90	18.90
" 17	72 "	2.15	21.60

Clamp Head, Fig. 658, with Wrought screw and single nut.

Diam. of Screw,	1 in.	1½ in.	1¾ in.
Each,	\$1.00	1.20	1.45

Clamp Head, Fig. 655, with Wrought screw and double nut.

Diam. of Screw,	1 in.	1½ in.	1¾ in.
Each.	\$1.20	1.45	1.70

MANUFACTURERS' AND BUILDERS' STEEL BAR VISE CLAMP. FIG. 656.

We particularly recommend this Clamp to all manufacturers who require a strong screw clamp. In it is retained the important feature of instantly gripping the work, the clamping arm or jaw locking at any point desired. The bar is made of heavy H shaped steel, and is not weakened by notches or holes, making it not only the strongest, but the lightest and most portable clamp of its kind made.

No. 3,	\$1.70 each;	opens 3 feet.
" 4,	2.00 "	" 4 "
" 5,	2.35 "	" 5 "
" 6,	2.70 "	" 6 "
" 8,	3.40 "	" 8 "

CARPENTER'S DOOR CLAMP. FIG. 659.

Fig. 659 shows the clamp mounted. Price, each, \$1.60. Fixtures only, \$1.15

PIANO-MAKERS' CLAMP, FIG. 657.

No.	Each.	Per Doz.	Opens.	Bar.
56	\$0.75	\$ 7.50	2 ft. 4 in.	½ x 3
57	0.95	9.50	3 " 4 "	½ x 3
58	1.10	11.00	4 " 4 "	½ x 3
59	1.25	12.50	5 " 4 "	½ x 3
60	1.40	14.00	6 " 3 "	1½ x 3½
61	1.50	15.00	7 " 3 "	1½ x 3½
62	1.60	16.00	8 " 3 "	1½ x 3½

CABINET-MAKERS' CLAMPS.

We can also furnish what is known as a Cabinet-Makers' Clamp, in sizes to open from 2 to 6 feet. These are quite similar in style to Fig. 657, the bars being 1½ x 1½ inches. Prices upon application.

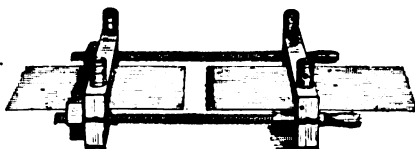


FIG. 662. BELT CLAMP.

These Clamps are used for tightening belts on pulleys, and combine three very essential requisites, viz., simplicity, strength, and moderate cost.

No. 63.	\$3.50 for belts up to 18 inches.
" 64.	4.50 " " 24
" 65.	6.00 " " 36

We can also furnish the Porter Patent Metal Belt Clamp, which is much higher in price and a superior tool.

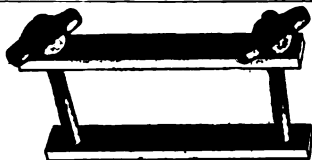


FIG. 663. FOUNDER'S FLASK CLAMP.

These Clamps are made of wood and are first-class in every respect.

	Per Doz.	Dia. Screws.	Takes Inside.
No. 1	\$9.00	1½ in.	15 x 18 inches.
" 2	7.50	1½ "	18 x 18 "
" 3	6.50	1½ "	12 x 15 "
" 4	5.00	1 "	10 x 13 "

JACKS AND JACK SCREWS.

Fig. 664 illustrates the ordinary style of Jack Screw; for want of space, we give here sizes most commonly used, as well as of the Ratchet Jack Screws, House Raising Screws and Press Screws; but we can furnish them in almost any size as regards diameter and length. For example: In the regular Press Screws we give but 18 sizes, while there are 85 sizes made regularly, and we can furnish any of them on comparatively short notice.



FIG. 664. JACK SCREWS.

Dia. Screw.	Each.	Hgt. over all.	Cap. tons.
1½	\$1.25	9	8
1½	1.50	13	8
1½	1.50	10	10
1½	1.90	14	10
1½	2.40	18	10
1½	2.00	12	14
1½	2.70	18	14
2	2.10	11	16
2	3.00	16	16
2	4.10	22	16
2½	3.20	11	24
2½	4.30	18	24
2½	5.80	24	24
3	7.80	20	30
3	9.30	26	30

The Ratchet Carrying Jack Screw, Fig. 665, has a steel base, brass nuts, wrought iron screws and legs. The ratchets, pawls and handles are made of steel and malleable iron. Diameter of lifting screw,



FIG. 665.

FIG. 666.

2½ inches; traverse screw, 1½ inches. Length of lifting and traverse screws, 18 inches. Height over all when down, 26 inches. The lifting capacity is 36 tons. Price, \$50.

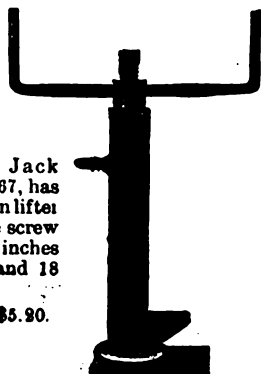


FIG. 667.

The Track Jack Screw, Fig. 667, has a wrought iron lifter welded to the screw which is 1½ inches in diameter and 18 inches long.

Price, each, \$5.90.

Fig. 666 represents a Tripod Ratchet Jack Screw. These have wrought iron screws, legs and bases, brass nuts and steel ratchets, pawls and handles.

We can also furnish a line of Ratchet Jack Screws with Bell Base, similar to Fig. 664. Prices on this style are about one-half of the Tripod Ratchet Screws.

PRICE LIST
TRIPOD RATCHET JACK SCREWS.

Diam. of Screw, in.	Price.	Height over all, in.	Capacity, tons.
2 $\frac{1}{2}$	\$20.00	18	24
2 $\frac{1}{2}$	24.20	24	24
2 $\frac{1}{2}$	22.60	18	28
2 $\frac{1}{2}$	23.80	24	28
2 $\frac{1}{2}$	25.25	30	28
3	28.00	24	36
3	29.80	30	36



FIG. 668. PRESS SCREW.

These screws are made of wrought iron, with cast iron nuts and caps. They are used for pressing cider, wine, tobacco, lard, cloth, etc., and the larger sizes are also used for house-raising screws.

Diam. of Screw, in.	Each.	Height over all, in.	Capacity, tons.
1 $\frac{1}{2}$	\$1.96	12	12
1 $\frac{1}{2}$	2.16	16	12
1 $\frac{1}{2}$	2.40	20	12
2	2.72	16	16
2	3.04	20	16
2	3.36	24	16
2	3.84	30	16
2	4.32	36	16
2 $\frac{1}{2}$	4.76	24	24
2 $\frac{1}{2}$	5.36	30	24
2 $\frac{1}{2}$	5.96	36	24
2 $\frac{1}{2}$	7.24	48	24
2 $\frac{1}{2}$	8.52	60	24
3	7.63	24	32
3	8.64	30	32
3	9.60	36	32
3	11.52	48	32
3	13.44	60	32

Intermediate diameters and lengths furnished at proportionate prices.



FIG. 669. CAST IRON SCREWS.

These Screws are cast with seamless threads, which makes them very smooth and uniform. They are used almost entirely for house-raising purposes.

They are 3 inches in diameter. Prices are as follows, and length given is over

all: 20 inches, \$2.35; 24 inches, \$2.65; 30 inches, \$3.15; 36 inches, \$3.70. Intermediate lengths furnished at proportionate prices.



FIG. 670. CHEESE PRESS SCREW.

Cheese Press Screws are made of wrought iron; other parts are cast iron.

Diam. of Screw, in.	Each.	Height over all, in.	Capacity, tons.
1 $\frac{1}{2}$	\$2.90	18	9
1 $\frac{1}{2}$	3.20	24	9
1 $\frac{1}{2}$	3.36	18	12
1 $\frac{1}{2}$	3.84	24	12
2	4.30	18	16
2	4.90	24	16
2	5.50	30	16
2	6.10	36	16



FIG. 671.

WAGON JACK.

The Lockport Improved Wagon Jack is made entirely of metal except the handle. The steel lifting rod is adjustable in height, and is held by a friction steel clutch, operated by powerful compound lever. The tube is wrought iron. It is the neatest, strongest and most compact Wagon Jack we know of.

No. 1, \$4.00, for threshers, engines, etc.

No. 2, \$9.40, for heavy trucks, etc.

No. 3, \$15.50, regular size for wagons, etc.

INQUIRIES—We have endeavored throughout this book, to answer a great many of the inquiries commonly received by us, but we wish it understood that we are at the service of our patrons and will cheerfully give any information that lies in our power to obtain. In this connection, we wish to say, that questions asked by our customers are sometimes overlooked. We do not mean to be careless, and if any inquiries are not answered, we ask that they be kindly repeated.

We present an assortment of the most commonly used styles and sizes of Lever and Screw Jacks, made by Joyce, Cridland & Co. They are made in large variety, and we can furnish a great number of sizes and styles not given here.



Can furnish other makes if desired.

FIG. 672. LEVER JACK.

No.	Price.	Hgt. when Down, In.	Rise, In.	Wght. Lbs.	Capacity Tons.
1	\$10.00	16	9	25	2
2	10.00	19	11	25	2
3	10.00	12	4	28	4
4	16.00	23	14	42	4
5a	23.00	24	10	70	8
6	26.00	28	15	95	15
7	30.00	38	25	118	15

The above Jacks are made of best malleable iron and steel forgings. They are used for portable engines, heavy wagons, railroad track and wrecking work.

We also furnish a special Jack of this form, adapted to stone-yard work, with crow bar top and long foot, and a line of Compound Lever Jacks with Toggle movement. Will send complete catalogue upon application.

Fig. 673 is a new Toothed Trip Jack, which in many cases can be used to excellent advantage. The frame and lever are malleable iron; lever has hard steel bearings for pins on the lifting pawl.

The lifting and holding pawls, link and bar, are forged steel. Teeth on bar and holding pawl are milled out and case-hardened.

To trip the Jack, hold out the lever and place the trip (attached to a chain) on top of lifting pawl, with plate part in front of teeth; place lifting pawl as if in gear for lifting; bear down on lever and the bar will drop.

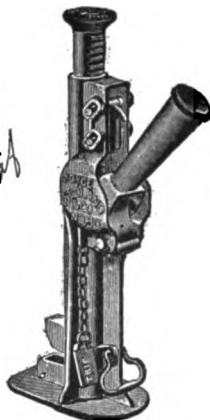


FIG. 673.

TOOTHED TRIP JACK.

No. 29, \$15.00.
Height when down, 20 inches; rise of bar, 10 in.; weight, 38 lbs.; capacity, 5 tons.

No. 30, \$20.00.
Height when down, 24 inches; rise of bar, 12 in.; weight, 70 lbs.; capacity, 10 tons.

Fig. 674 represents a Double Movement Screw Jack. These work twice as rapidly as the Single Screw. The friction which in a Single Screw occurs under the cap, is in this jack distributed over the surface



FIG. 674.

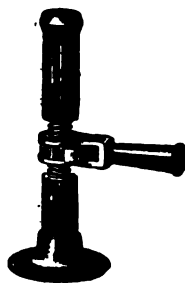


FIG. 675.

of the thread in the upper nut, reducing the ratio of friction and requiring no more power to operate than the Single Screw. These jacks are used largely for truck boxes, car and general work.

The No. 18 has a ground lift, and is especially adapted for bridge track work.

No.	Price.	Hgt. when Down, In.	Rise, In.	Wght. Lbs.	Capacity Tons.
12	\$10.00	10	4	30	8
14	10.00	13	7	35	8
16	17.00	16	10	38	8
18	20.00	19	8	45	8

Fig 675 represents a Double Movement Ratchet Screw Jack, suitable for house-movers' and builders' use, as well as for many kinds of railroad work.

No.	Each.	Height when down Inches	Rise. Inches	Wgt Lbs	Capacity, Tons.
19,	\$25.00	16	9	47	25
20,	30.00	20	12	55	25
21,	35.00	24	16	65	25
21½,	45.00	36	24	85	25
22,	45.00	27	18	125	50
23,	50.00	33	24	145	50

The Nos. 19 to 21½ have 2½ inch steel screws; Nos. 22 and 23 have 3 inch steel screws.



FIG. 676. TRAVERSING JACK.

The above cut shows No. 37 Traversing Jack, price, \$65.00. Height, when down, 15 inches; rise of screw, 10 inches; horizontal movement, 15 inches; weight, 120 pounds; capacity, 8 tons.

No 37½ Traversing Jack, price \$55.00, same as No. 37, except that it has a six-way head, instead of having a spring ratchet.

These Traversing Jacks are made in some eight sizes, with capacities varying from eight to fifty tons.

We can also furnish the Traversing Base singly. This has a sliding plate, or rest, so that almost any style of jack can be used upon it.

HYDRAULIC JACKS.

We illustrate and give prices here of a few styles and sizes of Hydraulic Jacks, being the ones that are in most general use. There are a great many other sizes and special styles of hydraulic jacks made, which we can supply if desired.

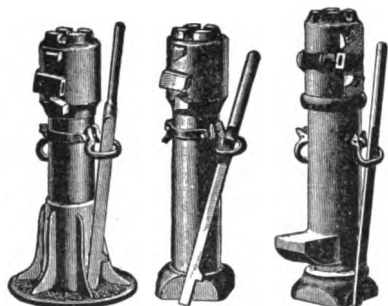


FIG. 677. FIG. 678. FIG. 679.

BROAD BASE SMALL BASE. GROUND LIFT.

The Broad Base Jack, Fig. 677, is used where the jack stands upon the ground, or light board, and where steadiness is required. Are used largely under locomotives, cars, etc.

Capacity, Tons.	Each.	Height, Inches.	Rise. Inches.	Weight Pounds
4	\$40.50	11	8	26
4	50.00	25	12	62
7	57.50	25	12	71
7	60.00	31	18	83
10	61.00	25	12	100
10	78.00	36	22	115
15	96.00	32	18	150
20	112.00	32	18	188
30	128.00	26	12	250

Fig 678, Small Base, is used where a good, firm rest can be obtained and there is sufficient room under the work. They are furnished in the same sizes as the Broad Base, the price being ten per cent less on the four and seven ton sizes, and twenty per cent less on the other sizes.

Fig. 679, Ground Lift, is used where there is not room for the head of jack under the work, and is the style generally used for moving engines, boilers, machinery, etc.

Capacity, Tons.	Each.	Height, Inches.	Rise. Inches.	Weight. Pounds.
4	\$52.00	24	12	60
7	61.00	25	12	80
7	63.00	32	18	94
10	64.00	26	12	110
10	72.00	32	18	140
15	96.00	26	12	145
20	128.00	26	12	190

PIPE-FITTING TOOLS.

In selecting a line of Pipe-Fitting Tools, we have given our customers quite a range, as regards variety of styles in the different makes. Of late years there has been a constantly increasing demand for



these tools, from the fact that the use of steam, both for power and heating, has increased enormously; and a set of pipe tools has become almost an imperative necessity to any concern using steam.

Pipe Reamers, Fig. 679, come in same sizes and take same prices as Pipe Taps.

The sizes of Pipe Taps, Pipe and Fittings, are based upon the *nominal* inside



diameter of the pipe. Thus, for example, what is called a $\frac{1}{2}$ inch pipe tap, is supposed to be suitable for the outside of a so-called $\frac{1}{2}$ inch pipe, which really measures about $\frac{11}{16}$ on the outside and about $\frac{7}{8}$ on the inside.

For the convenience of our customers, we print herewith a complete table, giving dimensions of pipe and threads. The standard taper on pipe taps and dies is $\frac{1}{4}$ inch to the foot.

Size Pipe.	Each.	Drill for Tapping.	Outside Diam.	No. of Threads.
$\frac{1}{8}$	\$0.45 .58	$\frac{1}{8}$	$\frac{1}{8}$	27
$\frac{1}{4}$	0.50 .62	$\frac{1}{4}$	$\frac{1}{4}$	18
$\frac{3}{8}$	0.60 .50	$\frac{3}{8}$	$\frac{3}{8}$	18
$\frac{1}{2}$	0.75 .63	$\frac{1}{2}$	$\frac{1}{2}$	14
$\frac{3}{4}$	1.00 .84	$\frac{3}{4}$	$\frac{1}{2}$	14
1	1.25 1.04	1	$\frac{1}{2}$	11 $\frac{1}{2}$
1 $\frac{1}{2}$	1.50 1.25	1 $\frac{1}{2}$	1 $\frac{1}{2}$	11 $\frac{1}{2}$
2	1.85 1.54	2	2	11 $\frac{1}{2}$
2 $\frac{1}{2}$	2.50 2.10	2 $\frac{1}{2}$	2 $\frac{1}{2}$	11 $\frac{1}{2}$
3	4.75	3	3	8
3 $\frac{1}{2}$	6.75	3 $\frac{1}{2}$	3 $\frac{1}{2}$	8
4	11.00	4	4	8
4 $\frac{1}{2}$		4 $\frac{1}{2}$	4 $\frac{1}{2}$	8
5		5	5	8
6		6	6	8
7		7	7	8
8		8	8	8
10		10 $\frac{1}{2}$	10 $\frac{1}{2}$	8

PIPE STOCKS AND DIES.

Figs. 682 and 683 represent the ordinary style of stock, using a solid steel square die. They are made of malleable iron; are strong and durable.



FIG. 682. MALLEABLE PIPE STOCK.

No. 0, \$4.25, threads $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch pipe. Dies are 2 inches square by $\frac{1}{4}$ inch thick.

No. 1, \$6.00, threads $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$ and 1 inch pipe. Dies are about 2 $\frac{1}{2}$ inches square by $\frac{1}{4}$ inch thick.

No. 1 $\frac{1}{2}$, \$5.75, threads $\frac{1}{2}$, 1 and 1 $\frac{1}{2}$ pipe.

No. 2, \$5.75, threads 1, 1 $\frac{1}{2}$ and 1 $\frac{1}{2}$ inch pipe. Dies for Nos. 1 $\frac{1}{2}$ and 1 $\frac{1}{2}$ are about 3 inches square by $\frac{1}{4}$ inch thick.

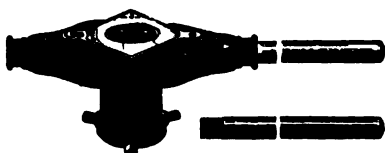


FIG. 683. WITH LEADER SCREW.

No. 2, \$9.00, threads 1 $\frac{1}{2}$, 1 $\frac{1}{2}$ and 2 inch pipe. Dies are about 4 inches square by $\frac{1}{4}$ inch thick.

No. 3, \$20.00, threads 2 $\frac{1}{2}$ and 3 inch pipe. Dies are about 5 inches square by 1 $\frac{1}{2}$ inches thick.

We can also furnish the No. 3 Stock with four arms (made somewhat heavier) at an added cost of \$4.50



FIG. 684.

Extra solid steel square pipe Dies, are furnished in the following sizes. 2 inches square, any size from $\frac{1}{8}$ to $\frac{1}{4}$ inch, 65 cents each; 2 $\frac{1}{2}$ inches square, any size from $\frac{1}{8}$ to 1 inch, 55 cents each; 3 inches square, any size from $\frac{1}{8}$ to 1 $\frac{1}{2}$ inches, \$1.10 each; 4 inches square, any size from $\frac{1}{8}$ to 2 inches, \$1.60 each; 5 inches square, for either 2 $\frac{1}{2}$ or 3 inch pipe, \$4.50 each.

All Stocks, with either Right or Left Hand Dies, same price.

RATCHET PIPE STOCKS.

The Ratchet Pipe Stock is a convenient tool for threading pipe in corners, trenches, or in positions that would be inaccessible with an ordinary Die Stock. This Stock can also be used as an ordinary Stock.

No. 1, \$11.25, threads $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$ and 2 inch pipe. Dies are about $2\frac{1}{4}$ inches square by $\frac{1}{2}$ inch thick.

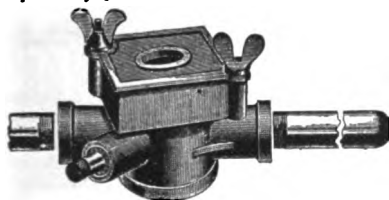


FIG. 685. RATCHET PIPE STOCK.

No. 1, Stock only, without Dies, \$5.00.
No. 2, \$18.00, threads 1 , $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 inch pipe. Dies are about 4 inches square by 1 inch thick.

No. 2, Stock only, without Dies, \$9.00.

The No. 2 Stock is provided with a leader screw.

ADJUSTABLE PIPE STOCKS.

Pipe Stocks with Adjustable Dies are generally used by steam and gas fitters, they can be used to good advantage when the pipe, or fittings, are slightly irregular or vary in size.



FIG. 686. WELLS BROS.' PIPE STOCK.

The Wells Bros.' Stocks take the place with us of the Armstrong, shown in former catalogues. They are practically of the same type, and are sold at about the same price. The Dies and Guides can be changed quickly, and the Dies can be re-sharpened.

No. 1, \$9.00, cutting $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$ and $1\frac{1}{2}$ inch pipe. Extra Dies per pair, \$1.35

No. 2, \$15.00, cutting $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 inch pipe. Extra Dies per pair, \$3.20

Left-hand Dies furnished at same prices

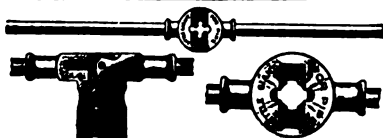


FIG. 587. FULL MOUNTED PIPE STOCKS.

Full Mounted Pipe Stocks have the same advantages as the Screw-Plates described on page 154. Each Die is provided with handles, making it most convenient for ready use. Adjustment for size and wear can be made by turning screws at end of Dies, as shown in sectional views.

Size,		$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Each,	\$1.60	1.60	2.00	2.00	2.70	
Length of Stock	9	13 $\frac{1}{4}$	23	26	32 in.	
Size,	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2		
Each,	\$2.70	4.05	5.40	6.98		
Length of Stock	36	41	46	52 in.		

The above prices include Stock, Die and Guide complete, for Pipe.



FIG. 688. DUPLEX PIPE STOCK.

The Duplex Pipe Stock is quite similar in construction to the old and well-known Jarecki Stock; is very easily adjusted, and by means of a spring gauge, can be instantly opened and removed from pipe, instead of turning back; and as readily set again. The Dies can be re-sharpened.

No. 1, \$9.75, cutting $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$ and $1\frac{1}{2}$ inch pipe

No. 2, \$12.75, cutting $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$ and $1\frac{1}{2}$ inch pipe

No. 3, \$16.50, cutting 1 , $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 inch pipe

No. 3 $\frac{1}{2}$, \$18.75, cutting $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 inch pipe.

No. 4, \$30.00, cutting $1\frac{1}{4}$, 2 , $2\frac{1}{4}$ and 3 inch pipe

No. 5, \$41.25, cutting $2\frac{1}{4}$, 3 , $3\frac{1}{4}$ and 4 inch pipe.

We can furnish the above Die Stocks complete with a Cutting-off attachment, at an extra expense of \$2.50 for Nos. 1, 2, 3 and $3\frac{1}{2}$; and \$4.00 for Nos. 4 and 5.

FORBES' PATENT DIE STOCKS.

Every one who has ever done cutting or threading of pipe, and especially of large sizes, with the old style long-handled stock, knows well the difficulty with which it is attended. From two to four men are required to do the work, and even then it is seldom that anything is attempted larger than four inches. This want has placed on the market a machine that is powerful enough to allow one man to cut off and thread all sizes of pipe up to six inches, and even eight inches, by hand, with ease; and with the smaller sizes, a boy can thread two and three inch pipe with only one hand on the crank, thus saving the expense and labor of from two to four men.

All machines are provided with opening and adjustable dies, and all sizes, except the Nos. 1 and 1½, are fitted with a cut-off attachment.

With ample strength, they combine lightness and are perfectly portable, so that even an 8 inch machine can be carried to outside work, like any other tool; and all delay and expense arising from carting the pipe backward and forward from the shop is avoided.

With this arrangement of machine great compactness is obtained, which makes it especially adapted for working in confined places. Even if the pipe to be threaded is at the bottom of a trench and only one end exposed, the machine can be slipped on and the pipe threaded without removing it from the ground.

All dies are adjustable, and if one die of the set is lost or broken it can be replaced by the number, without supplying an entire new set. This is a feature possessed by no other make. Any part can be duplicated by simply naming it & sending the shop number of machine.

All gears are cut from the solid.

The chief difference between these and most other makes of pipe threading machines is, that, instead of turning the heavy length of pipe in the dies, the comparatively light dies are turned around the pipe. Thus we are able to furnish a machine that is lighter, smaller, more compact, more simple of construction, requiring less power to run it, and above all, cheaper than any of the other standard machines in the market.

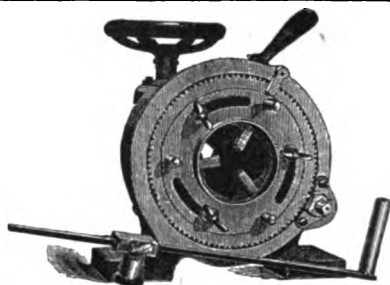


FIG. 689.

No. 1, \$47.50, weighs, 80 lbs.; threads ½, ¾, 1, 1½, 1¾ and 2 inch pipe. Right and Left hand.

No. 1½, \$71.25, weighs 115 lbs; threads 1, 1½, 1¾, 2, 2½ and 3 inch pipe—Right and Left hand. The dies are opening and adjustable to any variation of the fittings, but have no cut-off, as we find that on small pipe a roller cutter will do twice the work of any Hand Machine in the market.

All other sizes of machines are fitted with cut-off attachments.

The No. 1 Machine is arranged to take solid dies.

Price, so arranged, but without the solid dies, \$45.00

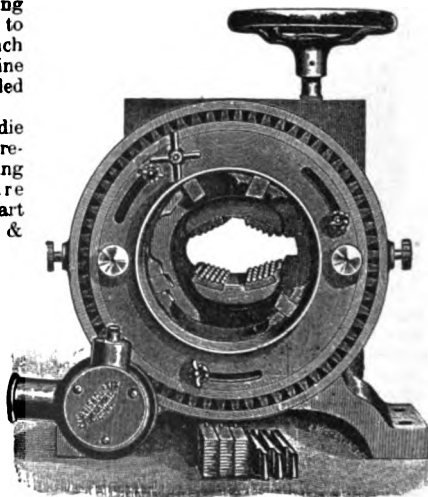


FIG. 690. NO. 2 HAND MACHINE.

The Nos. 2, 2½, 2½A, 2½B and 2½C Machines are of the same general description as the Nos. 1 and 1½, except in the following particulars: As all sizes of pipe included in the range of the No. 2 Machine are of the same standard thread, there is in this size of machine a lead screw feed for the dies, instead of a pressure feed, as in the Nos. 1, 1½, 2½ and 2½A, etc.

This lead screw has the same number of threads to the inch as the pipe to be threaded, and is cut on the back of gear. As the gear revolves it engages with brass lead blocks attached to the side of the shell, thus causing the gear to recede into the shell, and the dies are fed to the pipe.

When the thread is cut and the lead blocks thrown out, the gear can be drawn forward ready for new work, without running back over the thread.

The gear is pushed as far back into the shell as it will go, held by a stop on top, allowing a rotary without the traveling movement; the cut-off tool is then placed in slot and is fed forward or back by a powerful double wedge screwed behind it.

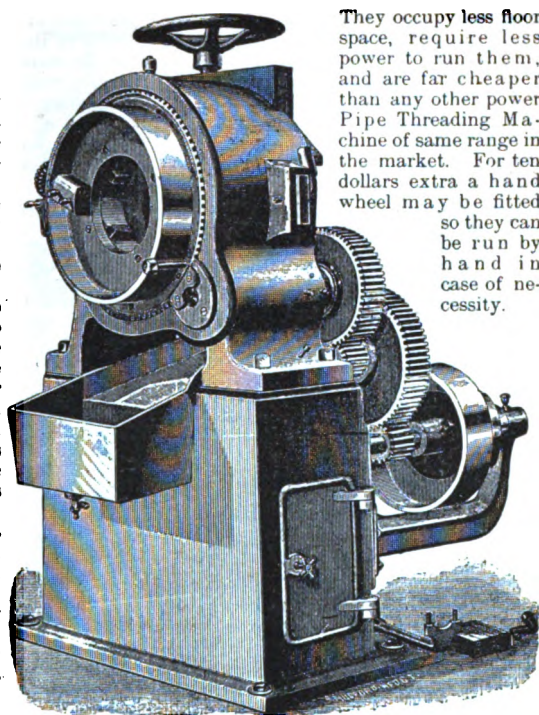


FIG. 691. NO. 3½ POWER MACHINE.

All sizes of these machines up to No. 3½ can be taken from the base and used as hand machines.

No.	Price.	Threads Pipe.		Wgt. lbs.
2	\$80.75	2½ to 4 in.	R. H.	175
2½	95.00	1½ to 4 "	R. H.	175
2½A	109.25	1½ to 4 "	R. & L.	180
2½B	104.50	1 to 4 "	R. H.	180
2½C	123.50	1 to 4 "	R. & L.	185
3	109.25	4 to 6 "	R. H.	310
3A	123.50	3½ to 6 "	R. H.	315
3B	142.50	2½ to 5 "	R. H.	320
3C	166.25	2½ to 6 "	R. H.	325
3F	180.50	1 to 6 "	R. H.	330
3D	308.75	2½ to 8 "	R. H.	600

POWER MACHINES.

These machines are strong and powerful in every particular. The vise for holding the pipe is self-centering. The dies open and adjust to any variation of fittings.

They occupy less floor space, require less power to run them, and are far cheaper than any other power Pipe Threading Machine of same range in the market. For ten dollars extra a hand wheel may be fitted so they can be run by hand in case of necessity.

No.	Price.	Threads Pipe.	Wgt. lbs.
2	\$133.00	2½ to 4 in. R. H.	330
2½	142.50	1½ to 4 " R. H.	330
2½A	156.75	1½ to 4 " R. & L.	330
2½B	152.00	1 to 4 " R. H.	330
2½C	171.00	1 to 4 " R. & L.	335
3	161.50	4 to 6 " R. H.	440
3A	171.00	3½ to 6 " R. H.	450
3B	190.00	2½ to 5 " R. H.	500
3C	213.75	2½ to 6 " R. H.	510
3F	237.50	1 to 6 " R. H.	515

No.	Price.	Threads Pipe.	Wgt. lbs.	Floor Space inches
3½	\$380.00	2½ to 8	1600	36 x 40
4	617.50	2½ to 8	2500	36 x 40
4A	712.50	2½ to 8	2500	36 x 40
5	1425.00	2½ to 12	5500	47 x 65

All of the above Machines are provided with a Cutting-off Attachment.

PIPE MACHINES.

Pipe Threading Machines are made in almost endless variety. We can furnish any style of machine desired.

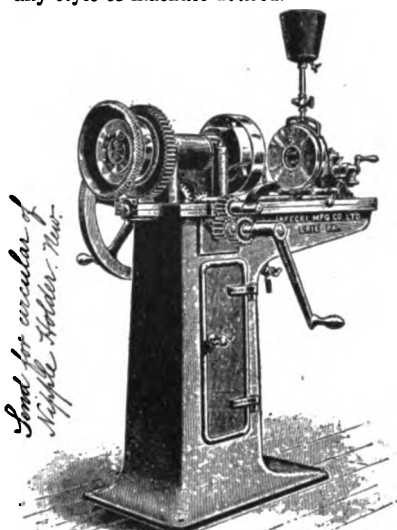


FIG. 692. JARECKI PIPE MACHINE.

The Jarecki Pipe Machine is one of the most desirable. We illustrate here the small size, cutting up to 2 inch pipe. These machines are made with a capacity up to 12 inches, and we would be pleased to correspond with any one who may require a larger size.

No. 6 Machine, for Hand use, \$80.00, complete with right-hand dies, $\frac{1}{4}$ to 2 inches; weight, 800 lbs.

No. 7 Machine, for Hand and Power use, \$105.00; capacity same as No. 6; weight, 860 lbs.

The dies are quick opening and adjustable. Each set of four pieces cuts two sizes of pipe, which is a great point in favor of the machine when new dies are required.

After pipe is threaded, there is no backing off the dies; all that is necessary is simply to open the dies and run die-head back. If pipe is to be cut off, the dies will expand far enough to admit of pipe passing through them to the cutting-off knife. The die-head is also provided with an adjustable stop-pin, which will only

allow the cam to move to the point required to thread the proper size, without the necessity of carefully resetting for every thread to be cut.

Machine has on back end of spindle an adjustable, self-centering chuck to center the pipe; also the same on die-head, to steady the pipe when being cut with cutting-off knife. The gripping chuck is self-centering and very powerful.

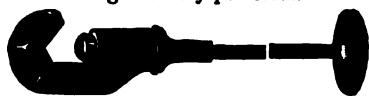


FIG. 693. EUREKA PIPE CUTTER.

The Eureka is of the Stanwood type, and a better tool we think. Notice that the Nos. 1 and 3 will take all sizes pipe from $\frac{1}{4}$ to 3 inches.

No.	1	2	3
Each,	\$1.25	2.00	5.50
Extra Cutter Wheel,	.15	.20	.30
Cuts Pipe, inches,	$\frac{1}{4}$ to 1	$\frac{1}{2}$ to 2	1 to 3



FIG. 694. BARNES' PIPE CUTTER.

The Barnes' Three Wheel Pipe Cutter is the one we sell most of; it can be used in corners and places where the ordinary Pipe Cutter would not work.

No.	1	2	3
Each,	\$2.00	2.75	5.50
Extra Cutter Wheel,	.15	.18	.24
Cuts Pipe, inches,	$\frac{1}{4}$ to 1	$\frac{1}{2}$ to 2	1 to 3
No.	4	5	6
Each,	\$9.00	13.50	18.00
Extra Cutter Wheel,	.35	.44	.50
Cuts Pipe, inches,	2 to 4	4 to 6	6 to 8

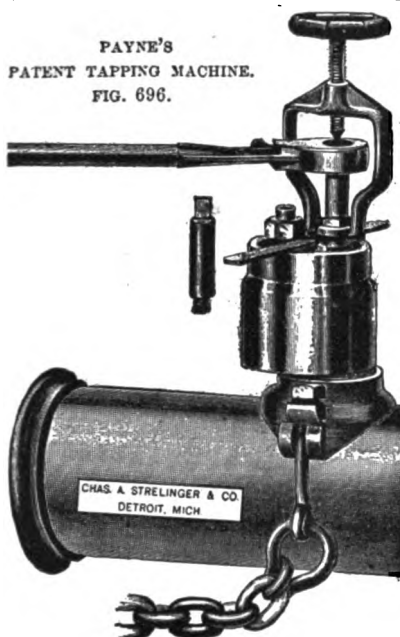


FIG. 695. SAUNDERS' PIPE CUTTER.

The Saunders' is provided with two rollers and cutting wheels. The rollers lessen the friction, and roll down the burr that is raised by the wheel; in our judgment, this is the best Pipe Cutter made.

No.	1	2	3
Each,	\$2.10	3.15	9.80
Extra Cutter Wheel,	.18	.24	.45
Cuts Pipe, inches,	$\frac{1}{4}$ to 1	1 to 2	2 to 3

PAYNE'S
PATENT TAPPING MACHINE.
FIG. 696.



The Payne's Tapping Machine, Fig. 696, is used for tapping water, gas or steam mains while *under pressure*. It is one of the simplest and most complete machines in the market; has no valves nor cocks, and there is no changing from start to finish. Simply turning the Head of the machine half way around, brings the cock where the drill was and vice versa; then by pushing down on the mandrel, the cock screws in. Full directions accompany each machine.

- No. 1, \$90.00, with $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ -inch Combined Taps & Drills & three Saddles.
 No. 2, \$119.50, with $\frac{1}{4}$, $\frac{1}{2}$ and 1-inch Combined Taps & Drills & three Saddles.
 No. 3, \$135.00, with $\frac{1}{4}$, 1 and $1\frac{1}{4}$ -inch Combined Taps & Drills & three Saddles.
 No. 4, \$157.50, with 1, $1\frac{1}{4}$ and $1\frac{1}{2}$ -inch Combined Taps & Drills & three Saddles.

The capacity of No. 1 machine is $\frac{1}{4}$ to 1 in. No. 2, $\frac{1}{4}$ to $1\frac{1}{4}$ in. No. 3, $\frac{1}{4}$ to $1\frac{1}{4}$ in. No. 4, $\frac{1}{4}$ to 2 in. Extra ratchets, \$2.50.

[X]

Mandrels, \$3.00. Saddles, \$3.00. Chain and Bolts, \$3.00. Yoke Feed, \$2.00.

Fig. 697 represents a "Crown" or Dry Pipe Tapping Machine. This machine will tap on the top, side, or any angle desired. The saddle is malleable iron, and the body which holds the tap and drill, is of bronze metal. The saddles are made for all sizes of pipe. Price of machine with one saddle, chain, feeder,

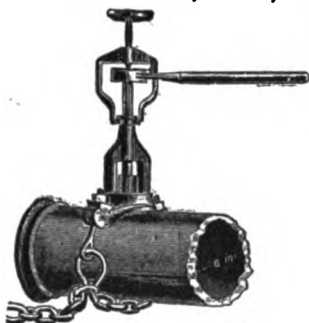


FIG. 697. CROWN TAPPING MACHINE.

yoke and ratchet, \$18.00. Extra saddles, \$2.00 each; extra ratchets, \$2.50 each. We also have an extra heavy ratchet for larger work, price \$4.00.

By ordering chain proper length, and extra saddles, this machine will tap any size pipe. For prices of Taps, see below.



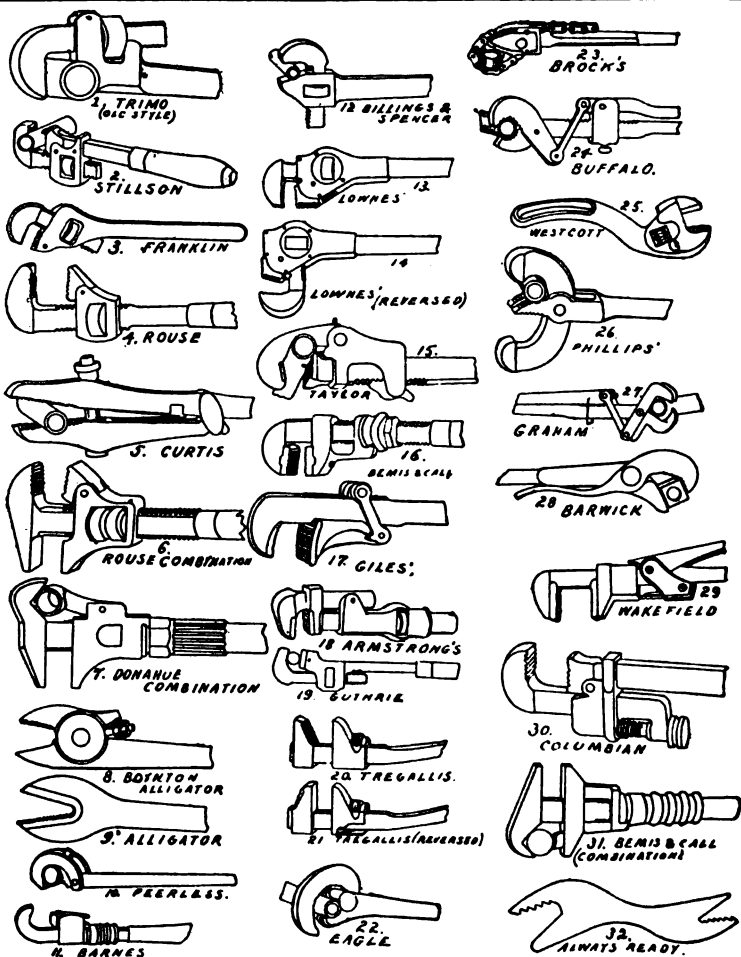
FIG. 698.

COMBINED TAP AND DRILL.

The Combined Tap and Drill, Fig. 698, is used generally for drilling and tapping gas and water pipes *under pressure*. They are generally used with taper spline shank as shown in cut, but we can furnish them with square shanks fitting ratchets if desired. The stock sizes are $6\frac{1}{4}$ inches long over all. Can furnish other lengths with any style of shank desired.

Prices of Single Combined Tap and Drill as shown in Fig. 698, as follows:

Size Pipe,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 in.
Each,	\$2.00	3.00	4.00	4.50	5.00
Size Pipe,	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3 in.
Each,	\$6.00	7.00	8.00	10.00	



PIPE WRENCHES*.

In the above cut are represented nearly all styles of pipe wrenches that have been advertised and placed on the market. There are perhaps six or eight styles besides these that are fairly well known, and two or three hundred styles, the majority of which have never gotten beyond the making of the original model and Patent Office.

Out of the thirty styles shown here, we

have sold and used twenty-eight, and, in our judgment, the world would be just as well (and the inventors better) off, if at least fifteen of them had never been discovered.

We have selected the pipe wrenches, shown, described and priced in the following pages as being the best in their

*Within the few months that have elapsed since this article was written, there have been issued from the United States Patent Office, patents on nineteen new styles of Pipe Wrenches.

various classes. Have sold hundreds—if not thousands—of nearly all of them, and, while our line may appear limited as compared with those shown in other catalogues, they can be depended upon as being first-class in all respects.



FIG. 699. STILLSON PIPE WRENCH.

The Stillson Pipe Wrench is standard, and so well known that an extended description is unnecessary. The 24 inch and larger sizes have steel handles. The lengths as given in table below, are for Wrench with jaw extended.

Length,	6	8	10	14 in.
Takes Pipe to	$\frac{1}{4}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$ "
Each,	\$1.35	1.35	1.50	2.00
Jaws,	.50	.50	.60	.75
Frames,	.20	.20	.25	.35
Nuts,	.20	.20	.35	.30

Length,	18	24	36	48 in.
Takes Pipe to	2	2 $\frac{1}{2}$	3 $\frac{1}{2}$	5 "
Each,	\$2.65	4.00	8.00	12.00
Jaws,	1.00	1.50	3.00	4.50
Frames,	.45	.50	.60	.80
Nuts,	.35	.40	.50	.65

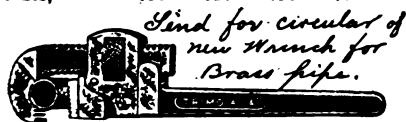


FIG. 700. TRIMO PIPE WRENCH.

The Trimo Pipe Wrench was first placed on the market two or three years ago, in the form shown in No. 1, page 182, but afterwards changed as in cut shown here. It is a handsome, well-made tool, drop-forged from bar steel, all parts interchangeable, and inserted jaw is placed in handle side of wrench, which can be renewed at slight expense when dull or worn. A good many prefer it on account of the fact that it has no wooden handle.

The sizes and prices on Trimo Wrenches are the same as on Stillson Wrenches, shown above.

Nearly all of the Pipe Wrenches shown here, can be used on nuts, in an emer-

gency, but for obvious reasons, we do not recommend them for this class of work.



FIG. 701.

Bemis & Call Combination Wrench, Fig. 701, like the Stillson, is the pioneer of its class, and is a superior tool. It is made of the best material, and parts interchangeable. They are made with either short or long nut, but we no longer keep the short nut wrenches in stock, as the long sleeve nut is very much superior and the difference in price is comparatively small.

Length,	10	12
Takes pipe, $\frac{1}{4}$ to 1	$\frac{1}{4}$ to 1 $\frac{1}{2}$	
Each,	\$1.70	1.90
Length,	15	18
Takes pipe, $\frac{1}{2}$ to 2 $\frac{1}{2}$	$\frac{1}{2}$ to 3	
Each,	\$2.70	3.40



FIG. 702. ALLIGATOR WRENCH.

The Alligator Wrench is sold very extensively, and is particularly useful in turning pipe or round iron in narrow spaces.

No.	Each.	Length, Inches.	Holds Pipe.	Holds Rd. Iron.
1	\$0.25	7	$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{1}{4}$ to $\frac{3}{4}$
2	.70	10	$\frac{3}{4}$ to 1	$\frac{3}{4}$ to 1
3	1.40	16	$\frac{1}{2}$ to 1 $\frac{1}{2}$	$\frac{1}{2}$ to 1 $\frac{1}{2}$
4	2.10	22	1 $\frac{1}{2}$ to 2	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
5	3.15	27	2 to 3	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$

The Always Ready, Fig. 703 (next page), is of the Alligator Type, and the smaller sizes are very popular; is a "handy" tool nicely finished and nickel-plated.

No.	1	2	3	4
Each,	\$0.45	65	1.00	1.40
Length,	5	7	9 $\frac{1}{2}$	11 $\frac{1}{2}$

No. 4 is the same size as No. 1, but thinner.

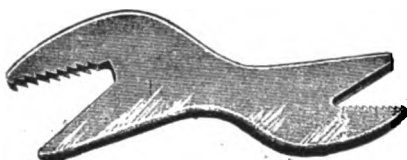


FIG. 703. ALWAYS READY WRENCH.

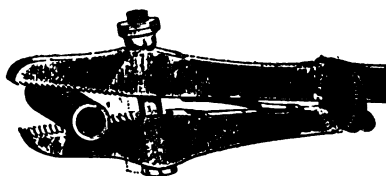


FIG. 704. CURTIS PIPE WRENCH.

The Curtis wrench is, we believe, the only practical, adjustable alligator wrench made, and is desirable in many places.

Length,	9	15	18	22 in.
Each,	\$1.60	2.10	2.45	3.50
For pipe,	$\frac{1}{2}$ to $\frac{3}{4}$	$\frac{1}{2}$ to $1\frac{1}{2}$	$\frac{1}{2}$ to 2	$\frac{1}{2}$ to $3\frac{1}{2}$
Rd. iron,	$\frac{1}{2}$ to $1\frac{1}{2}$	$\frac{1}{2}$ to 2	$\frac{1}{2}$ to 3	$\frac{1}{2}$ to 4

CHAIN TONGS.

Chain Tongs have very largely taken the place of the various styles of Adjustable Pipe Tongs. For many years these tongs were used almost entirely on the larger sizes of pipe, but of late we are selling a great many of them in the smaller sizes. They are made in great variety, but the Brock's, Fig. 705, are the best known and most commonly sold.

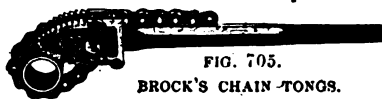


FIG. 705.

BROCK'S CHAIN TONGS.

No.	Each.	Takes Pipe	Lgth. Inches.	Wgt. lbs.
0	\$2.00	$\frac{1}{2}$ to $\frac{3}{4}$ inch.	12	1 $\frac{1}{2}$
1	2.80	$\frac{1}{2}$ to $1\frac{1}{2}$ "	20	4
2	4.15	$\frac{1}{2}$ to 2 $\frac{1}{2}$ "	27	8
3	5.65	$\frac{1}{2}$ to 4 "	37	15
4	8.25	$1\frac{1}{2}$ to 8 "	50	27
5	13.50	2 to 14 "	64	46

Extra Chains for Brock's Chain Tongs: No. 0, 50 cts.; No. 1, 60 cts.; No. 2, 75 cts.; No. 3, \$1.10; No. 4, \$1.35; No. 5, \$2.00.

Extra Jaws for Brock's Chain Tongs, per pair: No. 0, \$1.36; No. 1, \$1.80; No. 2, \$2.50; No. 3, \$4.00; No. 4, \$5.00; No. 5, \$8.50.

The Rochester Pipe Tongs, Fig. 706, are favored by some of our customers, especially in the larger sizes, as the range of pipe to which they are adapted varies considerably from that of the Brock's Chain Tongs. They are made of the very best materials and in the best manner, and in every respect are first-class tools.

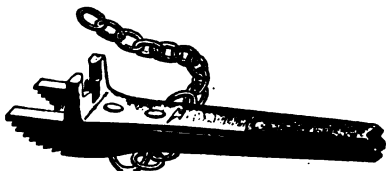


FIG. 706. ROCHESTER CHAIN TONGS.

No.	Each.	Takes Pipe.	Length, Inches.	Wgt. lbs.
2	\$3.65	1 to 3	27	9
3	4.15	$1\frac{1}{2}$ to 5	36	14
4	6.00	2 to 7	48	24
5	8.30	$2\frac{1}{2}$ to 10	60	40
6	10.65	4 to 16	79	60

PIPE TONGS.

Since the introduction of the numerous styles of Pipe wrenches and Chain tongs, the old fashioned Plain and Adjustable tongs have been compelled to take a back seat. There are still, however, a great many of them sold, especially of the Brown's Adjustable pattern.

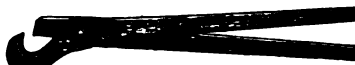


FIG. 707. COMMON PIPE TONGS.

Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2	3 in.
Each,	\$0.35	.40	.40	.45	.55	.65
Size,	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4	5 in.
Each,	\$0.85	.95	1.20	1.60	2.10	



FIG. 708. BROWN'S ADJUSTABLE TONGS.

No.	1	$1\frac{1}{2}$	2
Each,	\$0.65	.80	1.00
Holds Pipe	$\frac{1}{2}$ to $\frac{3}{4}$	$\frac{3}{4}$ to 1	$\frac{1}{2}$ to $1\frac{1}{2}$ in.
No.	3	4	
Each,	\$1.35	\$2.70	
Holds Pipe	1 to 2	$1\frac{1}{2}$ to 3 in.	

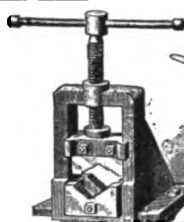


FIG. 709.
NO. 0 PIPE VISE.

No. 0 Pipe Vise, Fig. 709, has a malleable iron frame, not hinged; takes all size pipes from $\frac{1}{4}$ to 2 inch. Price, \$2.75.



FIG. 710.
NO. 3 1/2 PIPE VISE.

No. 3 1/2, Fig. 710, is a simple Hinged Pipe Vise with malleable iron frame, and hardened steel jaws; takes all size pipes from $\frac{1}{4}$ to 2 inch. Price, \$3.75.

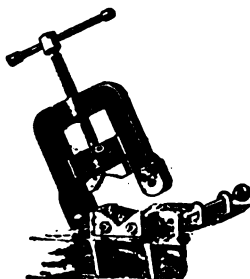


FIG. 711.
STYLE OF NOS. 3, 5, 6 AND 7

Fig. 711 represents style of the Nos. 3, 5, 6 and 7 Pipe Vises. These are all made of malleable iron with hardened steel jaws.

No. 3,	\$ 4.20,	takes from $\frac{1}{4}$ to 2 in. pipe.
" 5,	6.00,	" $\frac{1}{4}$ " 3 "
" 6,	8.25,	" $\frac{1}{4}$ " 4 "
" 7,	13.50,	" $\frac{1}{4}$ " 6 "

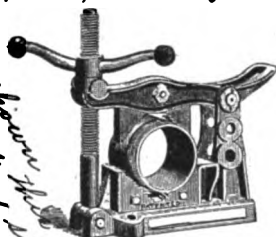


FIG. 712.
JARECKI PIPE VISE.

We only sell the Jarecki Pipe Vise, Fig. 712, in the larger sizes for heavy work. No. 3A takes all size pipes from $1\frac{1}{4}$ to 6 inch. Price, \$20.00. No. 4A takes all size pipes from 6 to 12 inch. Price, \$30.00.

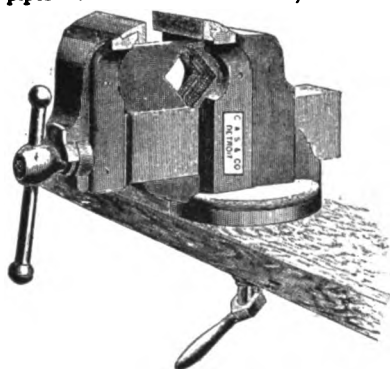


FIG. 713.
COMBINATION PIPE VISE.

Combination Pipe Vises we sell largely to manufacturing establishments where it is desirable that one vise shall answer all purposes. This style, Fig. 713, is made by the Parker Vise Co., and we believe it is the best vise of this class on the market.

No. 87, \$9.60, weight, 41 lbs.; for holding 2 inch pipe and under.

No. 88, \$12.00, weight, 60 lbs.; for holding 3 inch pipe and under.

No. 88 1/2, \$16.50, weight, 94 lbs.; for holding 4 inch pipe and under.

No. 89 1/2, \$21.00, weight, 141 lbs.; for holding 6 inch pipe and under.

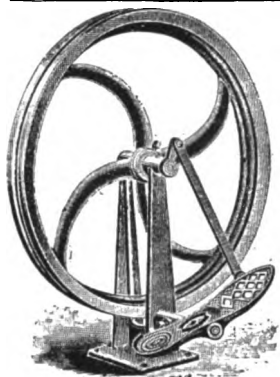


FIG. 714.

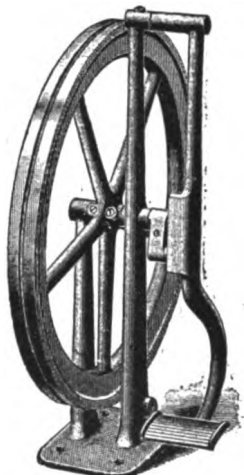


FIG. 715.

Foot Wheels are used for running Polishing Heads, Jewelers' Lathes, Dental Lathes and Machinery, and can be used to advantage for a great variety of purposes. The Wheels shown in Figs. 714 and 715 are the Oliver make, and we think they are the best made and finished wheels offered in the market; they are a little higher in price than most other makes.

No. 1, see Fig. 714, \$3.00. This has a grooved face for round belt, but can be used with a flat belt. The wheel is 18 inches in diameter.

No. 2, \$3.75, is the same as No. 1, but the wheel is not grooved.

No. 3, Fig. 715, \$8.00, is a much larger and heavier wheel than the other. The treadle has the reversible feature; wheel is 20 inches in diameter; weighs complete, 65 lbs.



FIG. 716.

HAND AND POWER MILLS.

In Figs. 716 and 717 we illustrate Hand and Power Mills, or Rolls. We can furnish these in nearly fifty different sizes, and will send descriptive catalogue to those desiring it.

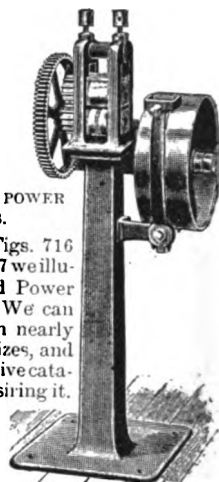


FIG. 717.

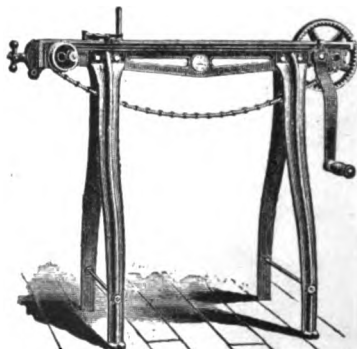


FIG. 718. IMPROVED HAND DRAW BENCH.

These machines are a great improvement over the old wooden Bench. The tongs can be started at any point in the endless chain. Length, 4 feet; weight, 110 lbs; price, \$20.00.

We can furnish Power Draw Benches of any size, and solicit correspondence with those in need of this class of machinery.

PUNCHES.

Fig. 720 represents a solid round Punch. These are made of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch steel. All sizes, 15 cents each; postage, 3 cents.

No. 00, 0, 1, 2, 3, 4, 5, 6, 7, 8.
Size, $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{2}$

Fig. 721 is a Tinner's Prick Punch made of $\frac{3}{4}$ inch Octagon Steel. Price, each, 15 cents; postage, 3 cents.



FIG. 720. SOLID ROUND PUNCH.



FIG. 721. PRICK PUNCH.



FIG. 722. CENTER PUNCH.



FIG. 723. FANCY CENTER PUNCH.

Fig. 722 is a Center Punch made from $\frac{1}{2}$ inch Octagon Steel. Price, each, 15 cents; postage, 3 cents.

Fig. 723 is a fancy Center Punch, made of first quality steel, but is nowise better than the one shown in Fig. 722, excepting in appearance. Price, each, 25 cents; postage, 3 cents.

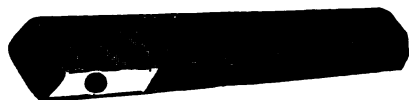


FIG. 724. TINNERS' RIVET SET.

No.	00	0	1	2	3
Each,	\$0.45	.45	.37	.37	.30
Postage,	.06	.06	.05	.05	.04
No.	4	5	6	7	8
Each,	\$0.30	.23	.23	.20	.20
Postage,	.04	.04	.03	.03	.03



FIG. 725.



FIG. 726.



FIG. 727.

No.	Each.	Hole, in.	No.	Each.	Hole, in.
00	\$0.20	$\frac{1}{4}$	8	.20	$\frac{1}{4}$
0	.20	$\frac{1}{2}$	9	.20	$\frac{1}{2}$
1	.15	$\frac{3}{4}$	10	.25	$\frac{1}{2}$
2	.15	$\frac{1}{2}$	13	.30	$\frac{1}{2}$
3	.15	$\frac{1}{4}$	16	.35	$\frac{1}{2}$
4	.15	$\frac{1}{2}$	13B	.50	$\frac{1}{2}$
5	.15	$\frac{1}{2}$	14B	.60	$\frac{1}{2}$
6	.15	$\frac{1}{2}$	15B	.70	$\frac{1}{2}$
7	.20	$\frac{1}{2}$	16B	.80	$\frac{1}{2}$

The above prices are for Round Belt Punches, Fig. 725.

Oval Belt Punches, Fig. 726, are made in same variety of sizes as Round Belt Punches in the common sizes. The prices are 10 cents each more than the Round. We carry but four or five sizes in stock.

Sizes and prices of Round Drive Punches Fig. 727, as follows:

Diam. of Hole.	Each.	Diam. of Hole.	Each.
$\frac{1}{4}$	\$0.75	$\frac{1}{4}$	\$2.00
$\frac{1}{2}$	.80	$\frac{1}{2}$	2.10
$\frac{3}{4}$	.85	$\frac{3}{4}$	2.25
$\frac{1}{2}$	.90	$\frac{1}{2}$	2.75
$\frac{1}{2}$	.95	$\frac{1}{2}$	2.90
$\frac{1}{2}$	1.00	2	3.00
$\frac{1}{2}$	1.05	2 $\frac{1}{2}$	3.25
1	1.10	2 $\frac{1}{2}$	3.50
$\frac{1}{2}$	1.65	2 $\frac{1}{2}$	4.00
$\frac{1}{2}$	1.75	2 $\frac{1}{2}$	4.50

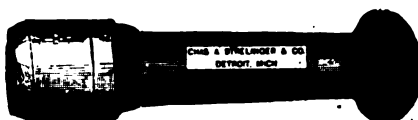


FIG. 728. TINNERS' HOLLOW PUNCHES.

These are used for cutting out thin metal. All sizes up to 1 inch are made of solid cast steel; larger sizes have cast iron shanks.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	1	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$0.40	.60	.80	1.00	1.20
Size,	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	
Each,	\$1.40	1.60	2.00	2.40	

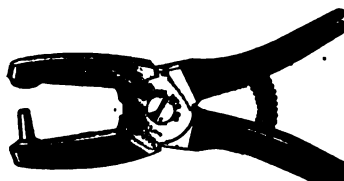


FIG. 729. SPRING PUNCH.

We can furnish the Spring Punches, Fig. 729, with great variety of sizes of tubes, varying from $\frac{1}{8}$ to $\frac{1}{4}$ inch, and can furnish extra tubes fitting these holders.

Size,	4	6	8	10 in.
Each,	\$0.45	.50	.65	.75

Extra tubes for 4 and 6, 15 cents; for 8 and 10, 20 cents. Tubes to fit sizes as follows: $\frac{1}{8}$ inch, $\frac{1}{8}$ to $\frac{1}{4}$; 6 inch, $\frac{1}{8}$ to $\frac{1}{4}$; 8 inch, $\frac{1}{8}$ to $\frac{1}{4}$; 10 inch, $\frac{1}{8}$ to $\frac{1}{4}$ inch.

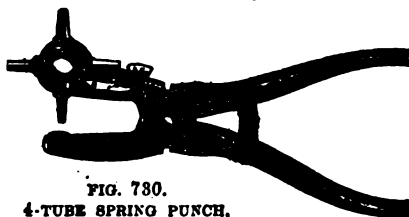


FIG. 780.

4-TUBE SPRING PUNCH,

Fig. 780 is a well made Spring Punch, nicely finished and nickel plated; has 4 tubes varying in size of hole from $\frac{1}{8}$ to $\frac{1}{4}$ inch. Price, each, \$1.25; postage, 12 cents. Extra tubes, each, 15 cents.

The Morrill's Punch, Fig. 731, is designed for punching holes in paper, card-

board and thin sheet metals. It is made simple, powerful and durable, and is a most convenient tool to have in the shop or tool chest.

No. 1, \$1.00, is 7 inches long, and arranged to receive punches and dies $\frac{1}{8}$,



FIG. 731.

$\frac{1}{4}$ and $\frac{1}{2}$ inch in diameter; only one punch and die is supplied with each tool.

No. 2, \$1.35, is 9 inches long and has only one punch and die $\frac{1}{2}$ inch diameter.

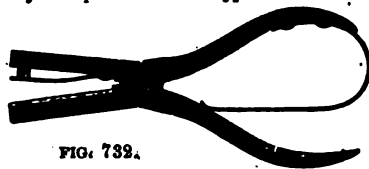


FIG. 732.

Fig. 732 represents a simple form of Spring Ticket Punch, punching round holes. 4 inch, 60 cents each; postage, 6 cents. 5 inch, 75 cents each, postage, 8 cents.



FIG. 733.

WOODMAN'S CONDUCTORS' PUNCH.

We consider this the best line of Conductors' Punches made. Sizes No. 1 and 2 are the most commonly sold, but we can furnish both regular and special punches in almost endless variety, including Duplex, Coupon Extension, Patent Edge Cutter, etc., etc. Will send descriptive catalogue upon application.

No. 1, with Fancy Die, \$2.50; with Round Die, \$2.00; postage, 8 cents.

No. 2, with Fancy Die, \$3.00; with Round Die, \$2.00; postage, 8 cents.

The No. 2 is similar in style to the No. 1 but has a longer reach.



FIG. 734. BOILER MAKERS' SCREW PUNCH.

No.	Each.	Punch hole, in.	Thick Iron, in.	From edge, in.	Wgt. lbs.
0	\$12.00	$\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{2}$	17
1	15.00	$\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$	27
2	20.00	$\frac{3}{8}$	$\frac{3}{8}$	2	40
3	30.00	$\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	60
$3\frac{1}{2}$	37.50	$\frac{5}{8}$	$\frac{5}{8}$	$3\frac{1}{2}$	90
4	40.00	$\frac{7}{8}$	$\frac{7}{8}$	4	110
5	45.00	1	1	4	150

Notice that the given capacities are for iron, *not steel*. The above prices include one Punch and Die; extra Punches and Dies are furnished at the following prices:

No.	0	1	2	3
Per pair,	\$2.10	2.40	2.40	3.00
No.	$3\frac{1}{2}$	4	5	
Per pair	\$3.00	3.00	3.60	

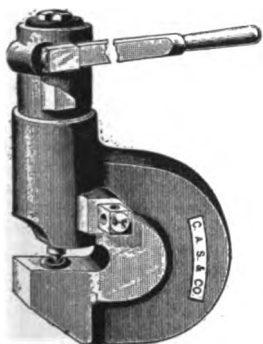


FIG. 735. HYDRAULIC HEAD PUNCH.

No.	Each.	Punch hole, in.	Thick Iron, in.	From edge, in.	Wgt. lbs.
1	\$48.00	$\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{2}$	50
2	63.00	$\frac{1}{4}$	$\frac{1}{4}$	2	85
3	88.00	$\frac{3}{8}$	$\frac{3}{8}$	$2\frac{1}{2}$	130
4	112.00	$\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	160

Extra Punches and Dies per pair:

No.	1	2	3	4
	\$1.75	2.25	3.00	4.00

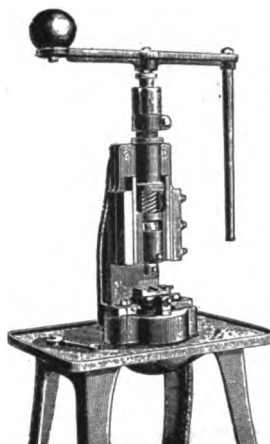


FIG. 736. SCREW PRESS.

Dimensions of above Press are as follows: Height over all, 69 inches; table, 19 x 28 inches; extreme length of stroke, $4\frac{1}{2}$ inches; greatest distance between slide and platen, 8 inches; weight, complete, 450 lbs. Price, \$60.00.

We can furnish Hand Screw Presses of all sizes and descriptions.

CUTTING'S HAND PUNCH.

Cutting's Hand Punch Fig. 737, is one of the best hand punches in the market; is made of good stock, nicely finished and warranted.

No. 1, \$15.30, will punch a $\frac{1}{8}$ inch hole in $\frac{1}{4}$ inch iron, $4\frac{1}{2}$ inches from edge; is furnished with 2 Punches and Dies $\frac{1}{8}$ and $\frac{1}{4}$ inch.

No. 2, \$21.60, will punch a $\frac{1}{4}$ inch hole in $\frac{1}{2}$ inch iron, or a $\frac{3}{8}$ inch hole in $\frac{1}{2}$ inch iron; is furnished with two Punches and Dies $\frac{1}{4}$ and $\frac{3}{8}$ inch.

Extra punches and dies can be furnished. Price, per pair, \$1.00.

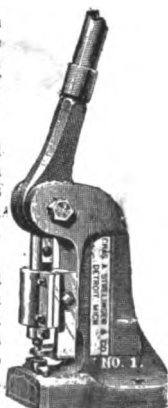


FIG. 737. Price, per pair, \$1.00.

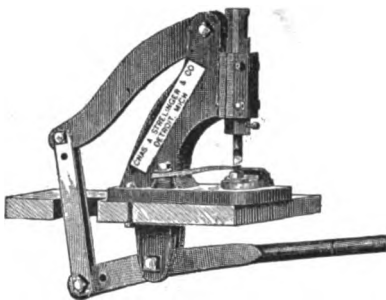


FIG. 738. LEVER PUNCH PRESS.

The above Press was made originally for cutting teeth in stone chisels; its capacity is $4\frac{1}{2}$ inches from centre of punch to back. Price of machine, with one die for marble tooth, and one die for stone tooth tools, \$20.00; or can furnish at the same price, with $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{1}{2}$ inch round punches and dies.

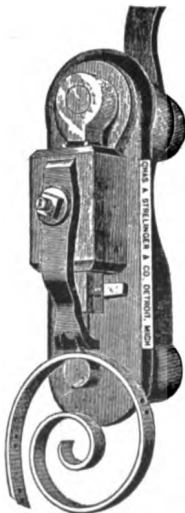


FIG. 739.

This cut shows several punchings made in a scroll.

For work of this kind the Scroll Punch, Fig. 739, excels all others on the market.

SCROLL PUNCH.

The Scroll Punch shown in Fig. 739, will punch a $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron. It can be held in the vise or can be firmly held in a cast-iron block made to fasten to the bench. Such block is furnished with each machine.

This tool is especially adapted for punching and slotting scrolls which otherwise would have to be drilled; and for punching small circles, such as pipes. Distance from centre of punch to face of machine $\frac{1}{2}$ inch.

Price, \$30.00.



Fig. 740 represents a portable Beam Punch, used on structural and building work. The No. 4 Punch is mounted on wheels and is much heavier and stronger than the No. 3.

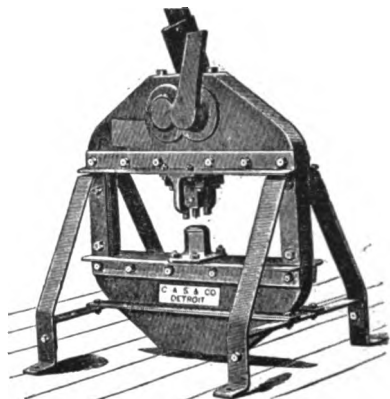


FIG. 740. BEAM PUNCH.

No.	Price.	Largest Hole.	Thick Iron.	Size Beams.	Wgt. Lbs.
1	\$90.00	$\frac{1}{2}$ in.	$\frac{1}{4}$ in.	to 12 in.	166
2	150.00	$\frac{3}{4}$ in.	$\frac{3}{8}$ in.	" 15 "	215
3	225.00	1 $\frac{1}{4}$ in.	$\frac{1}{2}$ in.	" 21 "	300
4	250.00	1 $\frac{1}{2}$ in.	$\frac{3}{4}$ in.	" 24 "	1050

BUFFALO PUNCHES AND SHEARS.

These tools are built and furnished in three forms, viz: Buffalo Combined Punch, Shear and Bar Cutter, Buffalo Continuous Shear, and Buffalo Independent Punch. The former is most suitable for blacksmith and general shop work, where use is found for a combined punching, shearing and cutting hand tool. The Continuous Shear is designed for sheet metal workers, being especially built for their requirements. The Independent Punch is used where a powerful hand punch is required.

Every machine is guaranteed to do the work specified as its capacity in the following table, and to require no crowding to perform such service. Every machine sold is thoroughly tested to the work listed as its capacity. The ease with which the work claimed may be performed is a surprise to many buyers, and oftentimes heavier work is attempted. The capacity table gives the greatest amount

of work which it is desirable to handle with each size, and anything attempted above this must be at the risk of the purchaser, who should bear in mind that this is a hand tool and not a power machine.

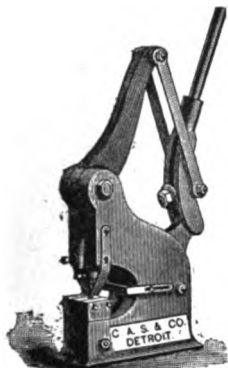


FIG. 741. BUFFALO PUNCH.

No. 14, \$37.50, will punch $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron. Complete, with one each, $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch punches and dies.

No. 15, \$45.00, will punch $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron. Complete, with one each, $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch punches and dies.

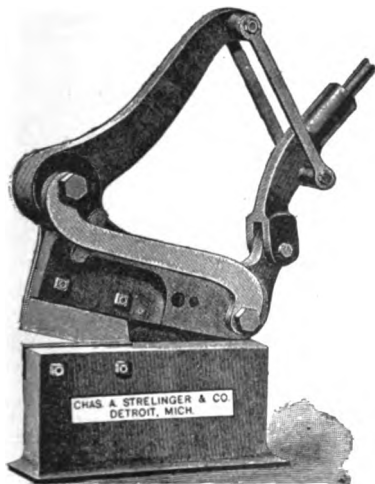


FIG. 742. CONTINUOUS SHEAR.

The Continuous Shear, Fig. 742, is suitable for Sheet Iron workers, and is provided with an attachment for cutting off round iron.

No. 8, \$37.50, will shear any thickness up to $\frac{1}{4}$ inch inclusive, and cut off round iron from $\frac{1}{2}$ to $\frac{3}{4}$ inch inclusive.

No. 9, \$75.00, will shear any thickness up to $\frac{1}{4}$ inch inclusive, and cut off round iron from $\frac{1}{2}$ to $\frac{3}{4}$ inch inclusive.



FIG. 743.

PUNCH, SHEAR AND BAR CUTTER.

This machine is suited more especially for Blacksmiths and general shop work.

No. 2, \$37.50, will punch $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron; is provided with one each $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch punches and dies; will shear iron up to $\frac{1}{4}$ inch thick and 2 inches wide, and cut off round iron from $\frac{1}{2}$ to $\frac{3}{4}$ inch inclusive.

No. 3, \$52.50, will punch $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron; is provided with one each $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch punches and dies; will shear iron up to $\frac{1}{4}$ inch thick and 3 inches wide, and cut off round iron from $\frac{1}{2}$ to 1 inch inclusive.

No. 4, \$75.00, will punch $\frac{1}{2}$ inch hole in $\frac{1}{2}$ inch iron; is provided with one each $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch punches and dies; will shear iron up to $\frac{1}{4}$ inch thick and 3 inches wide, and cut off round iron from $\frac{1}{4}$ to $1\frac{1}{2}$ inch inclusive.

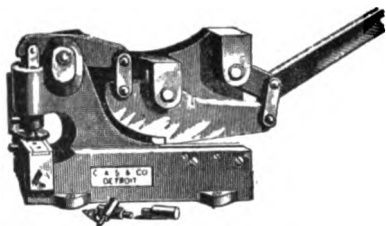


FIG. 744.

COMBINED PUNCH AND SHEAR.

The above cut represents a tool that, for light work, cannot be excelled. They are recommended by the manufacturer to shear and punch only up to No. 14 (about $\frac{1}{8}$ inch thick), but we have punched a $\frac{1}{8}$ inch hole in $\frac{1}{8}$ inch iron with the No. 1 Machine, and with little effort.

No. 1, \$18.50, with Punches and Dies $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$.

No. 2, \$22.50, with Punches and Dies $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{4}$ and $1\frac{1}{2}$.

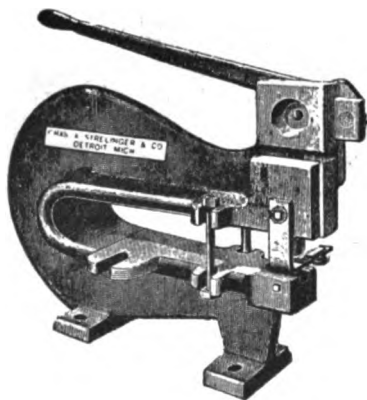


FIG. 745.

OGILVIE PUNCH.

This Punch is designed for Sheet Metal Workers. It will punch No. 12 iron to the center of a 30 inch sheet, and with the stay bolts (as shown in cut) will punch No. 8 iron $3\frac{1}{2}$ inches from the edge.

Price, with 3 Punches and Dies, \$22.50.

SMALL ROD CUTTER.

The Small Rod Cutter. Fig. 746, has 14 holes from $\frac{1}{8}$ inch to the smallest size.

For cutting drill rod or music wire, or other small rods of given length, this tool stands without a peer. For strength, simplicity and durability, and ease of cutting rods, it is superior to any cutter we know of. It can be held in a vise or screwed down on a bench. Price, \$5.00.



FIG. 746. SMALL ROD CUTTER.

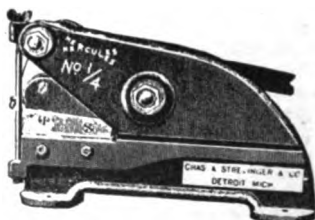


FIG. 747. CONTINUOUS SHEAR.

No. 1, \$24.00, cuts all sizes iron up to $\frac{1}{2}$ inch, inclusive. Weight, 100 lbs.

WE SELL PUNCHES AND SHEARS, but do not manufacture them. The tools represented on this, the preceding three or four pages, and the next page, are carefully selected by us, after having examined, used and sold Punches and Shears made in almost endless variety by twenty-nine different concerns. The difference in prices on various makes of tools, is quite as pronounced as the difference in quality. In some cases, we find that a machine selling at \$30.00 is, in every way, superior to a similar tool made by another concern, selling at a much higher price. We give our customers the benefit of our research and experience, with the belief that the Punches and Shears shown here represent the most complete line ever brought together in one book.

SHEAR AND ROD CUTTER.

No. 1, \$30.00, cuts flat iron up to $\frac{1}{2}$ inch thick, and round iron up to $\frac{1}{2}$ inch.

No. 2, \$42.00, cuts flat iron up to $\frac{1}{2}$ inch thick, and round iron up to $\frac{1}{2}$ inch.

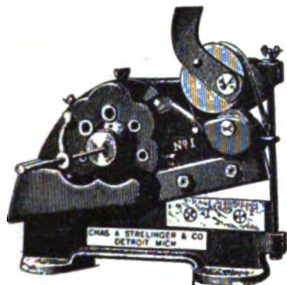
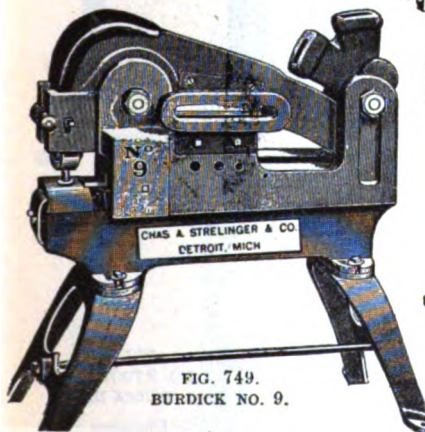


FIG. 748.

The Burdick Punch and Shear No. 9 is sold largely to blacksmiths and wagon-makers. It is a plain, strong machine, without any special finish; is furnished with four punches and dies, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$, and two sets of knives, one for cutting

FIG. 749.
BURDICK NO. 9.

flat and square iron, the other for cutting round. Iron of any shape can be cut without changing the knives. This machine will punch $\frac{1}{4}$ inch hole through $\frac{1}{2}$ inch iron; will cut bar iron $\frac{1}{2} \times 4$, or $\frac{1}{2} \times 3$, and cut off up to $\frac{1}{2}$ inch round iron. Price, \$37.50.

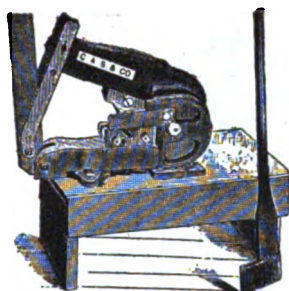


FIG. 750. ANGLE IRON SHEAR

This Shear, Fig. 750, will cut off 3 x 3 inches, and smaller sizes of angle iron, at one motion of lever; blades are heavy and supported at ends. Price, \$60.00.

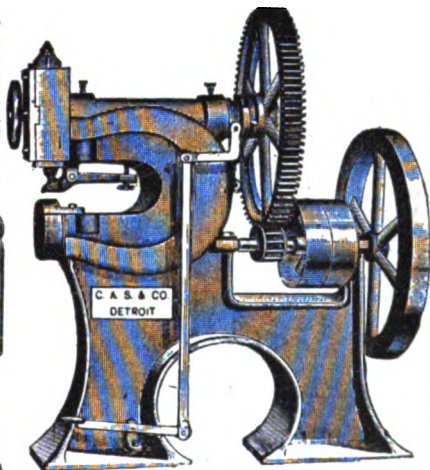


FIG. 751. POWER PUNCH SHEAR

In Fig. 751 is represented a type of Combined Punch and Shear for power. This particular style is made in five sizes. We sell them to boiler-makers and to shops where heavy plate iron is used. We have not sufficient space to describe and illustrate the various styles which we can supply. Will be pleased to furnish manufacturers' catalogues, with complete description, upon application.

FOOT PRESSES.

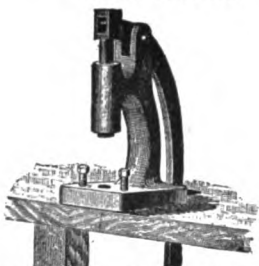


FIG. 752. NO. 0 FOOT PRESS.

The Press shown in Fig. 752, has slide motion of one inch; distance from bed to bottom of guide, $3\frac{1}{2}$ inches; from bed to bottom of slide when down, $2\frac{1}{2}$ inches; size of bed, $5\frac{1}{2} \times 3\frac{1}{2}$ inches, opening in bed, $1\frac{1}{2}$ inches; distance between die-bed bolts, 4 inches. Price, with treadle, \$15.00.

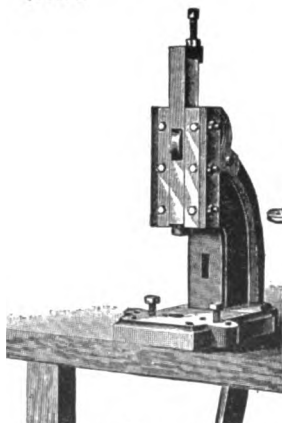
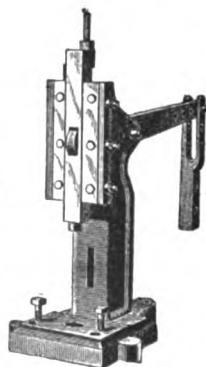


FIG. 753. NO. 2 FOOT PRESS.

Fig. 753 shows the kind of Foot Press in very general use among manufacturers of Brass Goods, it has a stroke of $1\frac{1}{2}$ inches; distance from bed to bottom of guides, 6 inches, from bed to bottom of slide when down, $2\frac{1}{2}$ inches; from center of slide to upright, 3 inches; between die-bed bolts, $5\frac{1}{2}$ inches or $7\frac{1}{2}$ inches; opening in bed, 2 inches diameter. Weight 150 lbs. Price, with treadle, \$22 50.

FIG. 754.
NO. 2 FOOT PRESS,
ON TABLE.

Has stroke of $1\frac{1}{2}$ inches. Dimensions same as Fig. 753. The table is 24×30 inches, and 30 inches high. Weight, 300 lbs. Price, with treadle, \$35 00.

FIG. 755.
NO. 2 FOOT PRESS,
EXTRA HIGH.

Distance from bed to bottom of guide, 9 inches. Other dimensions same as No. 2 Foot Press, Fig. 753. Weight, 155 lbs. Price, with treadle, \$24.00.

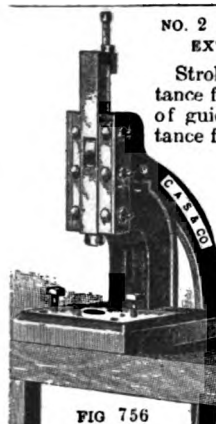


FIG. 756

NO. 2 FOOT PRESS, WITH EXTRA WIDE BED.

Stroke, $2\frac{1}{2}$ inches; distance from bed to bottom of guides, 6 inches; distance from bed to bottom of slide when down, 3 inches; from center of slide back to up-rights, 4 inches; distance between die-bed bolts, $7\frac{1}{2}$ or $5\frac{1}{2}$ inches, size of bed, 10×7 inches, hole in bed, $1\frac{1}{2}$ inches diam.

Weight, 170 lbs.
Price, \$24.00.

SPECIAL NO. 2 FOOT PRESS, FIG. 757.

Stroke, 9 inches; distance from bed to bottom of guides, 7 inches; distance from bed to bottom of slide when down, $4\frac{1}{2}$ inches; center of slide back to up-rights, 9 inches; distance between die-bed bolts, $5\frac{1}{2}$ or $7\frac{1}{2}$ inches; size of bed, 18×18 inches; hole in bed, 3 inches diam.

Weight, 390 lbs.
Price, \$45.00.

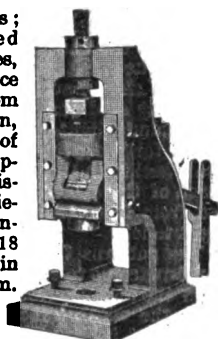


FIG. 758. KNUCKLE-JOINT FOOT PRESS,

	No. 1.	No. 2
Price with treadle,	\$60.00	\$75.00
Stroke,	$2\frac{1}{2}$ in.	4 in.
Bed to guides,	$6\frac{1}{2}$ "	$6\frac{1}{2}$ "
Bed to bottom of slide,	$4\frac{1}{2}$ "	$6\frac{1}{2}$ "
C't'rof slidetouprights,	3 "	$3\frac{1}{2}$ "
Between die-bed bolts,	$4\frac{1}{2}$ or $6\frac{1}{2}$ "	$6\frac{1}{2}$ or 8 in.
Weight,	275 lbs.	375 lbs.

**WEIGHTED
COMPOUND
LEVER
FOOT
PRESS.**

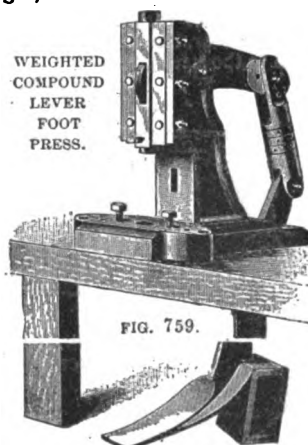


FIG. 759.

Stroke, 1 inch; distance from bed to bottom of guides, $6\frac{1}{2}$ inches; bed to bottom of slide when down, 5 inches; center of slide to up-rights, 3 inches; distance between die-bed bolts, $5\frac{1}{2}$ or $7\frac{1}{2}$ inches; size of bed, 13×6 inches; opening in bed, $2\frac{1}{2}$ inches diameter. Weight, 290 lbs. Price, \$50.00.

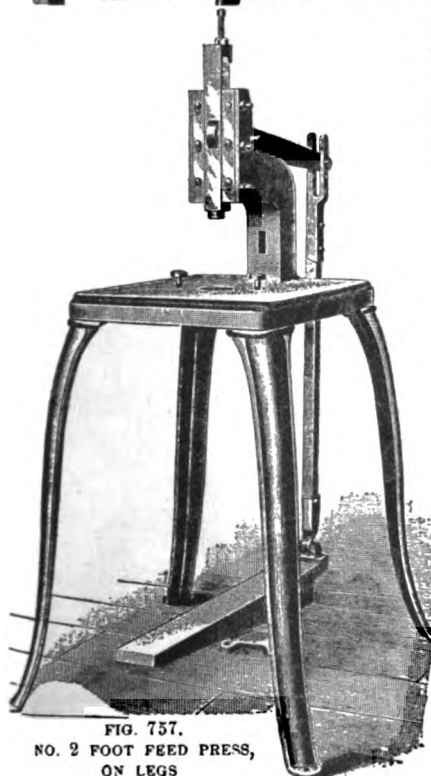


FIG. 757.
NO. 2 FOOT FEED PRESS,
ON LEGS

OPEN BACK SINGLE-ACTING PRESSES.

The advantage of the open back press over those with a solid back, and the crank on the end of shaft, are as follows: The crank is supported by journals on each side, preventing the shaft from springing and chafing; the opening in back admits light—a very necessary condition for the nice adjustment of dies; the wheel is on the side, and within easy reach of the operator, the metal can be fed from front to back, as well as from right to left.

The patterns for these presses are so constructed as to enable them to be made with the distance from bed to bottom of slide, the width between uprights, the manner of holding punches, size of opening in bed, etc., to suit requirements in all cases; making it possible to build presses adapted to any existing tools or fixtures. The table gives such sizes as are made for standard presses, when no special instructions are given, but any modification can be made to suit the purchaser.

When a press of special dimensions is required, we will furnish a blank specification with outline drawing, to be filled out in accordance with the requirements of the purchaser, and can in most cases conform to the sizes given.

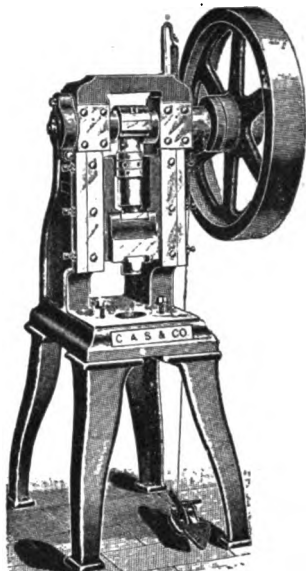


FIG. 761. NO. 4 OPEN BACK PRESS
Prices on next page

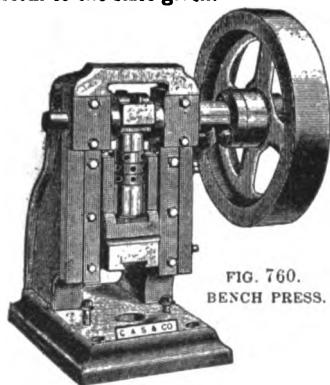


FIG. 760.
BENCH PRESS.

Fig. 760 represents the No. 2 Press without legs and designed to be placed on an ordinary bench. Dimensions are same as given in table on next page.

No.	0	1	2	3	4
Ea.	\$90.00	105 00	120.00	140 00	215.00
Wgt.,	175	415	500	650	1,200

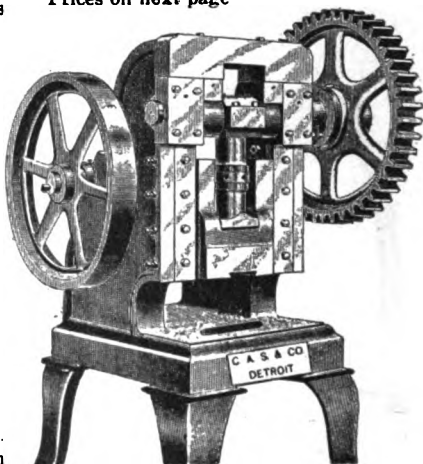


FIG. 762 GEARED PRESS.

These presses are made with cut gearing and steel pinions and fitted with tight and loose pulleys when desired. Prices on next page.

PRICE LIST OF STANDARD SINGLE-ACTING OPEN BACK PRESSES.

No. of Press.	Price, plain.	Price, Back-gear.	Weight of plain Machine, lbs.	Weight of fly wheel, lbs.	Dist. from bed to center of shaft.	Stroke, from one inch to	Dist. from bed to slide when down	Center of slide back to uprights	Dist. between Uprights.	Dist. between die-bed bolts.	Size of bed in width.	Size of bed, front to back.	Diam. of opening in bed.	Face of fly wheel.
1	\$110		450	75	14 $\frac{1}{2}$	1 $\frac{1}{2}$	4 $\frac{1}{2}$	2 $\frac{1}{2}$	4 $\frac{1}{2}$	5 $\frac{1}{2}$	9	6	3	24 in.
2	125		550	100	16	2	4 $\frac{1}{2}$	3 $\frac{1}{2}$	4 $\frac{1}{2}$	7	9 $\frac{1}{2}$	8 $\frac{1}{2}$	3	3
3	150	\$225	800	150	18 $\frac{1}{2}$	2	5 $\frac{1}{2}$	3 $\frac{1}{2}$	8	7 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	4	3 $\frac{1}{2}$
4	225	325	1450	320	24	3	6	4	8 $\frac{1}{2}$	8	14	9 $\frac{1}{2}$	4	4 $\frac{1}{2}$
5	275	375	2000	400	27 $\frac{1}{2}$	3	7	4 $\frac{1}{2}$	9 $\frac{1}{2}$	9	15 $\frac{1}{2}$	10 $\frac{1}{2}$	5	4 $\frac{1}{2}$
6	360	475	3000	620	31	3	7	4 $\frac{1}{2}$	11 $\frac{1}{2}$	10 & 13	18 $\frac{1}{2}$	11 $\frac{1}{2}$	6	5 $\frac{1}{2}$
7	500	625	4500	850	35 $\frac{1}{2}$	3	8	5	13	12 & 15	22	14	8	6
8	650	800	6500	1400	44 $\frac{1}{2}$	3	8	5 $\frac{1}{2}$	14 $\frac{1}{2}$	13 & 16	30	14	8	7

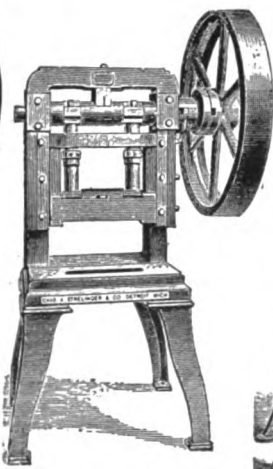
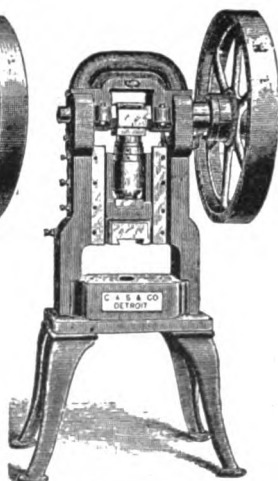


FIG. 763. INCLINED PRESS.

Fig. 763 shows the manner of mounting Open-Back Presses upon Fixed inclined stands for which all sizes are adapted. For prices see list on this page.

Fig. 764 represents a Double Connection Press, suitable for trimming and piercing work like corset steels, etc., or to receive gang punches or shear blades. This style of press is made in five different sizes, and we can also furnish special

(13)

FIG. 764.
DOUBLE-CONNECTIONFIG. 765.
ARCH PRESS.

presses of this pattern with dimensions conforming to specifications. Prices and further description upon application.

Fig. 765 represents Arch Presses which are designed for heavier kinds of work, and are unequaled for strength, the strain being in a direct line through the center of the uprights. Are made in a variety of sizes.

Illustrations, descriptions and prices upon application.

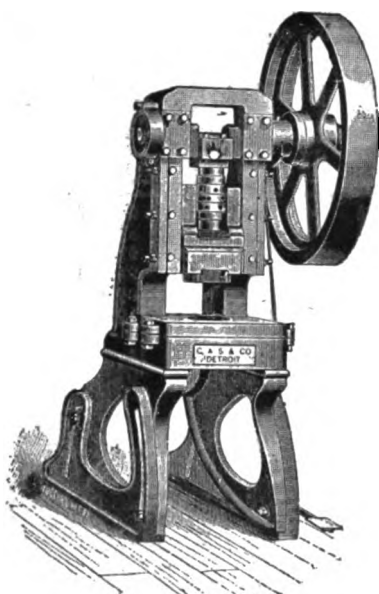


FIG. 766.

PATENT ADJUSTABLE INCLINED PRESSES.

These presses are similar to the regular line of open back presses, but have larger die accommodations. To change from upright to inclined position, loosen bolts upon sides of legs and push the press to the desired point; an operation easily performed.

For dimensions and prices see bottom of this page.

Besides the Presses which are here described, we can supply an almost unlimited variety of styles of regular and special Presses, and will furnish descriptive circulars and catalogues upon application. Among them are the following:

DOUBLE CONNECTION ARCH PRESS—Suitable for trimming drop-forgings, for punching or forming, and a variety of work requiring a large size press.

PILLAR AND WASHER PRESSES.—With Knock-out Attachment and large fly-wheel; used in connection with combination dies for cutting and piercing at one operation washers up to $1\frac{1}{4}$ inch.

GEARED DRAWING PRESS.—Used for drawing long shells or tubes.

BROACHING PRESS—Designed for broaching holes in forgings and castings.

HORIZONTAL RACK-AND-PINION PRESS.—Designed for drawing long, slender tubes of gold, silver or brass.

HORIZONTAL DRAWING, KNUCKLE JOINT, AND DOUBLE ACTING PRESSES.—For cutting and drawing shells or cutting metal.

DOUBLE-ACTING CAM, FORMING, AND PERFORATING PRESSES.—Designed for perforating sheet metal, or punching small work with Gang tool.

TRIPLE-ACTING PRESS.—Suitable for making small articles requiring three operations; such as cutting, drawing and stamping or forming. Will cut out, draw and stamp small pieces as fast as 200 per minute.

SHOT-SHELL, REDUCING, PRIMING, BULLET, WAD-CUTTING AND ASSEMBLING PRESSES.

PATENT ADJUSTABLE, SINGLE-ACTING INCLINED PRESSES.

No. of Press.	Price, plain.	Price, Back-geared.	Weight of plain Machine, lbs.	Weight of fly-wheel, lbs.	Stroke, from one inch to	Dist. from bed to slide when down	Center of slide back to uprights	Dist. between Uprights.	Size of bed, front to back.	Size of bed in width.	Diam. of opening in bed.	Thickness of bolster plate.	Face of fly-wheel.
3	\$135		650	120	2 $\frac{1}{2}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$	6	8	12	3	1 $\frac{1}{2}$	3 in
9	175	\$250	1100	150	2 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	8	10 $\frac{1}{2}$	14 $\frac{1}{2}$	.6	1 $\frac{1}{2}$	3 $\frac{1}{2}$ "
4	250	350	1800	350	3 $\frac{1}{4}$	7	5	8 $\frac{1}{2}$	12	17	8	2	4 $\frac{1}{2}$ "
5	300	400	2500	400	3 $\frac{1}{4}$	8	5 $\frac{1}{2}$	9 $\frac{1}{2}$	13 $\frac{1}{2}$	18 $\frac{1}{2}$	10	2	4 $\frac{1}{2}$ "
6	400	525	3500	550	4	8 $\frac{1}{2}$	5 $\frac{1}{2}$	10 $\frac{1}{2}$	14	21	11	2	5 $\frac{1}{2}$ "
7	525	650	5000	850	4	9	6	15	15	24	11	2	6 "

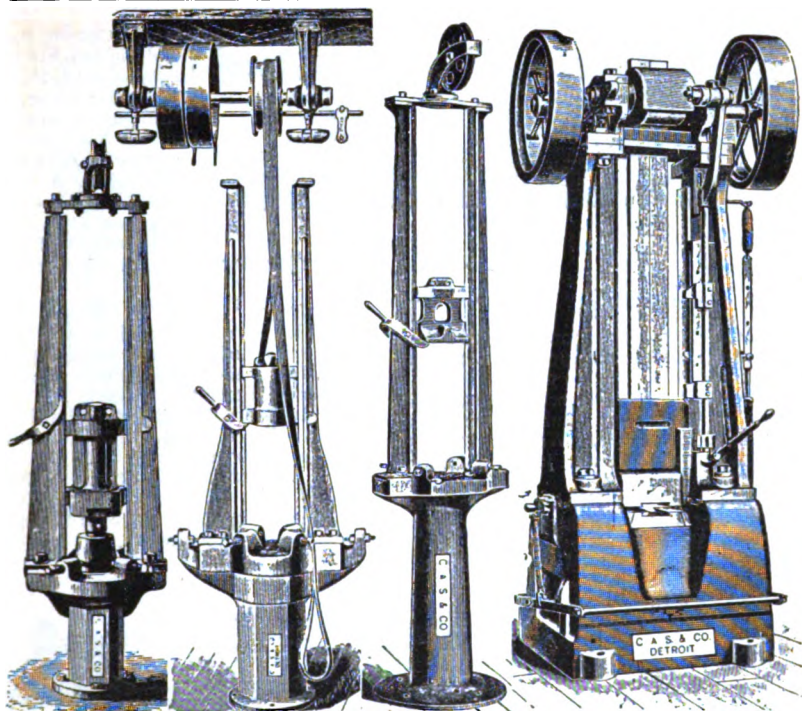


FIG. 767.
BENCH DROP
PRESS.

FIG. 768.
4 POPPET DROP
PRESS.

FIG. 769.
PORTABLE DROP
PRESS.

FIG. 770.
DROP HAMMER WITH AUTO-
MATIC LIFTER.

Fig. 767 represents a Portable Bench Drop Press. Distance between poppets, 5 inches; height from floor to top of base, 15 inches; weight of hammer, 25 to 50 lbs., as wanted; weight, 450 lbs. Price, \$70.00.

Fig. 768 is a Four-Poppet Drop Press, that is very popular for all kinds of light stamping; is made in two sizes; the prices include countershaft.

No. 1, \$130.00; weight of hammer, 60 lbs.; total weight, 1,000 lbs.; uprights, 60 inches long; $7\frac{1}{4}$ inches between uprights, and $6\frac{1}{4}$ inches between poppets.

No. 1 $\frac{1}{2}$, \$150.00; weight of hammer, 120 lbs.; total weight, 1,600 lbs.; uprights, 68 inches long; 9 inches between uprights, and 8 inches between poppets.

Fig. 769 shows Portable Drop Press with round base. Height from floor to top of base, 36 inches; rails are 5 feet

long; distance between poppets and rails, $5\frac{1}{4}$ inches; weight complete, 700 lbs. Price, \$100.00. We can furnish a Drop Press similar to Fig. 769, except that the distance between poppets is $5\frac{1}{4} \times 8\frac{1}{4}$ inches, and the distance between rails, 9 inches; weight, 850 lbs. Price, \$110.00.

With either of the above presses we can furnish hammers weighing from 15 to 60 lbs., as wanted.

Fig. 770 represents a Drop Hammer with Automatic Lifter. These are made in sizes from 450 to 1,500 lbs. (weight of hammer), and weighing complete from 9,000 to 27,500 lbs. Dimensions and prices upon application.

We can furnish a great variety of other styles of Drop Presses and Hammers, and invite correspondence regarding these tools.

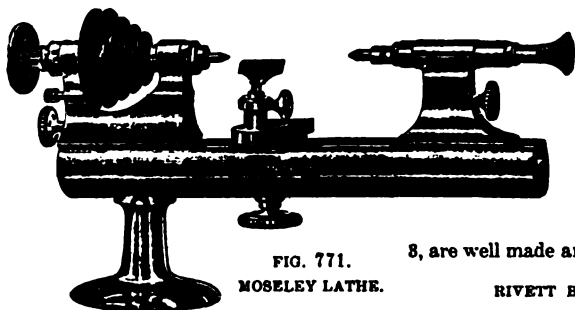


FIG. 771.
MOSELEY LATHE.

A watchmakers' or jewelers' lathe can oftentimes be used to great advantage on delicate and accurate work.

The cut, Fig. 771, represents the general style of these lathes, and is a fac-simile of the Moseley lathe. We usually carry in stock three styles of jewelers' lathes, as follow :

No. 1, Webster Whitcomb pattern. Length of bed, 11 inches; swings, $3\frac{1}{2}$ inches. Price, \$28.00. Complete with 6 Wire Chucks; 9 Wheel or Step Chucks; 1 each, Taper and Screw Chuck; 1 each, $\frac{1}{2}$ and $\frac{3}{4}$ inch Cement Brasses; $6\frac{1}{2}$ inch Cement Brasses; 4 Steel Tapers; 1 Chuck Block with Glass Globe and 9 ft. of Belting.

No. 2, Moseley pattern. Length of bed, $9\frac{1}{2}$ inches; swings $3\frac{1}{2}$ in. Price, \$25.00. Complete with 10 Wire Chucks; 3 Wheel Chucks; 1 each, Taper and Screw Chuck; 1 each, $\frac{1}{2}$ and $\frac{3}{4}$ inch Cement Brasses; $6\frac{1}{2}$ inch Cement Brasses, Tapers, Chuck Block and Belting.

Slide Rests for Nos. 1 and 2 lathes, \$17.50; Universal head, 16.50.

No. 3, Geneva lathe, is different in pattern from the Nos. 1 and 2. Length of bed, $9\frac{1}{2}$ in.; swings $3\frac{1}{2}$ in. \$20.00. Complete with same fixtures as No. 1.

Lathes Nos. 1, 2 and 3, are well made and handsomely finished.

RIVETT BENCH LATHES.

These Lathes are intended for all kinds of fine work, and are especially adapted for fine Tool-makers, Model-makers, Electricians and Watch tool makers.

No. 3 Lathe has 32 inch bed, and swings 7 inches. No. 4 Lathe has 36 inch bed, and swings 8 inches.

No. 3, without Attachments, \$100.00.

No. 4, " " 150.00.

Will mail complete catalogue of twenty-four pages, upon application.

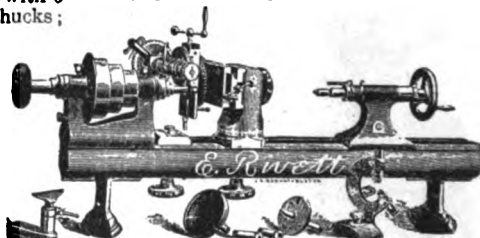


FIG. 772. RIVETT BENCH LATHE, NO. 3,
WITH MILLING ATTACHMENT.

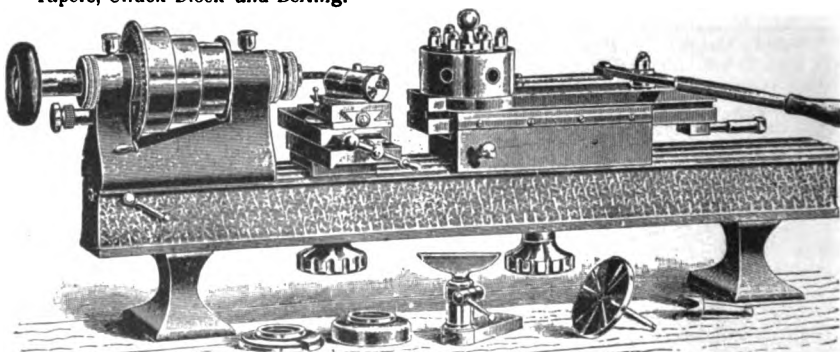


FIG. 773. RIVETT BENCH LATHE, NO. 4, WITH TURRET ATTACHMENT.

Fig. 774 is a neatly made small Lathe; dimensions are as follows: Swing, 6 inches; distance between centers, 20 inches; diameter of balance wheel, 18 inches. Price, with spur, long and

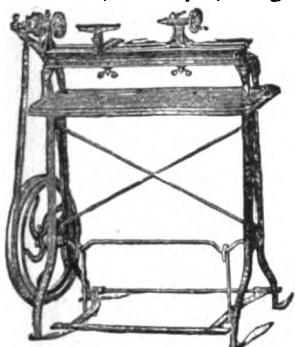


FIG. 774. QUACKENBUSH LATHE.

short rest and wrench, \$10.00; table with crank shaft, treadle and belting, \$6.00; balance wheel, \$4.50; lathe complete, as shown in cut, \$20.00.

Fig. 775 is an excellent high-class speed lathe, 8 inch swing, 36 inch bed, 20 inches between centers, with $\frac{1}{4}$ inch hole through

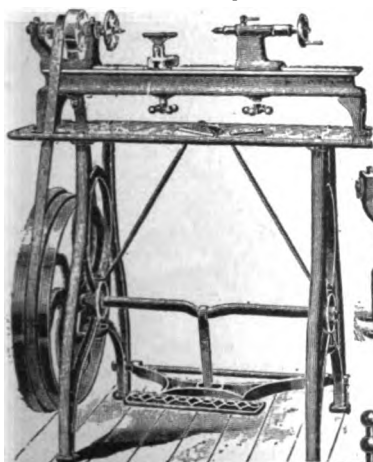


FIG. 775. OLIVER LATHE.

head stock; is furnished with two key rests and wrench. Price, complete, \$30.00. Weight, 250 lbs.

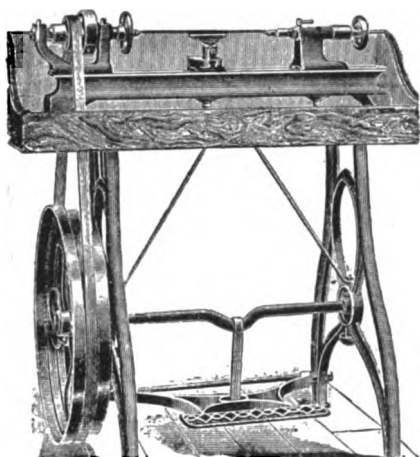


FIG. 776. JEWELERS' FOOT LATHE.

This lathe is the same as the preceding one, Fig. 775, except that it has a box top nicely finished and lined with heavy zinc. Price, \$40.50.

Fig. 777 is the same Lathe as shown in Figs. 775 and 776. Price, without countershaft, \$23.50. Price of countershaft, Fig. 779, \$3.00.

Slide Rest, Fig. 778, is adapted to the 8 inch swing lathe; is well made in every particular. Longitudinal motion 5 inches; transverse motion, $2\frac{1}{4}$ inches. Price, \$12.00.

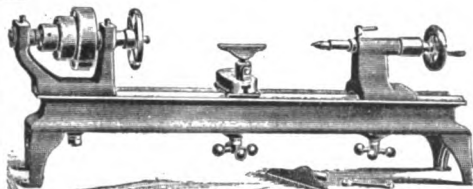


FIG. 777. BENCH SPEED LATHE.

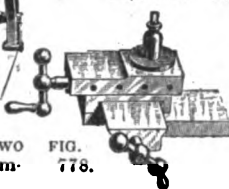


FIG. 778.

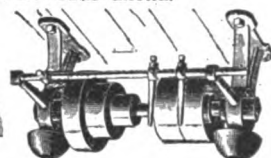


FIG. 779. COUNTERSHAFT

The Crown Foot Lathe, Fig. 780, is a well built lathe and designed for turning in wood or metals; boring, drilling, polishing, etc.

It has patent foot power by which the operator can obtain power with little fatigue. It consists of double treadles with a walking motion. The treadles are moveable and work independently of each other. Can be started or stopped instantly, and may be operated with both feet sitting, or one foot standing, as desired.

The head stock has a three-speed cone for $1\frac{1}{4}$ inch belt; hollow steel spindle with $\frac{3}{4}$ inch hole, and hard bronze metal boxes which are adjustable to take up the wear. The tail stock has a steel spindle with self-discharging center, cam-locking device, etc.

Each lathe is provided with two point, and one each, cup and spur centers, short and long T rests and wrench, complete, as shown in cut.

	Price.	Swing.	Between Centers.	Wgt.
No. 1,	\$36.00	9 in.	24 in.	245
" 2,	40.50	10 "	36 "	275

Countershaft for either No. 1 or 2 Crown Lathe, \$9.00.



Countershaft furnished in place of foot power, no extra charge. Unless otherwise specified we always send lathe with foot power as shown in cut.

FIG. 780. CROWN LATHE.

Fig. 781 represents the 9 and 11 inch Plain Foot Lathe. The foot-motion is of the most approved form, and workman-

ship is first-class in every particular. We can furnish back gears on the 11-inch Lathes if wanted, at an extra price.

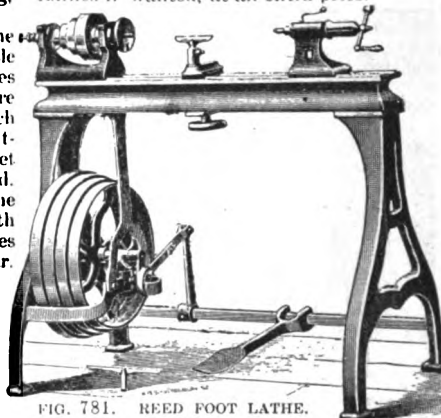


FIG. 781. REED FOOT LATHE.

Price*	Swing.	Lgth. bed.	Bot. Centers.	Weight.
	9 in.	3½ ft.	24 in.	322 lbs.
	9 "	4 "	30 "	336 "
	11 "	3 "	14 "	390 "
	11 "	4 "	20 "	415 "
	11 "	5 "	38 "	450 "

This Slide Rest is designed as an attachment for the Crown Lathe, but may be used on any 9 or 10 inch lathe. It is a well made tool and very desirable for working in metals. It will turn straight or tapering, and face or

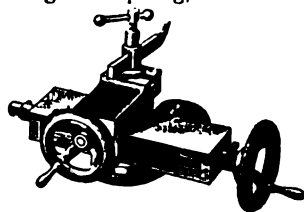


FIG. 782.

CROWN SLIDE REST.

square up surfaces to the full capacity of the lathe. The cross feed is 2 inches and longitudinal feed 5 inches. The tool post screws and gibs are steel, and the traverse screws covered.

No. 1 for 9 inch lathe, \$11.40; No. 2 for 10 inch lathe, \$14.25.

*Prices upon application.

HAND OR SPEED LATHES.



FIG. 783. REED HAND LATHE.

These lathes are well made in every particular. The Cone pulley is turned inside, as well as out, insuring a perfectly balanced and true running head. Head Spindles are made of cast crucible steel, and are hollow.

Countershafts for 9 and 11 inch Lathes have tight and loose pulleys, 6 inches diameter by 3 inches face, and should make 300 revolutions per minute.

Countershaft for 14 inch Lathes has tight and loose pulleys, 8 inches diameter by 2½ inches face, and should make 240 revolutions per minute.

Countershaft for 16 inch Lathe has tight and loose pulleys, 10 inches diameter by 3 inches face, and should make 190 revolutions per minute.

Countershaft included with Lathe, at prices given.

Swing, in.	Price.	Length Bed, ft.	Between Centers, in.	Wgt. lbs.
9	\$52.00	3½	24	263
9	55.00	4	30	280
11	67.00	4	38	360
11	70.00	5	40	400
14	90.00	5	38	600
14	94.00	6	45	625
14	100.00	8	69	700
16	116.00	5	29	700
16	119.00	6	41	828
16	126.00	8	65	900
26	272.00	8	44	2060
26	284.00	10	68	2220

We can furnish the 11, 14 and 16 inch Lathes with back gears, if desired. Prices upon application.

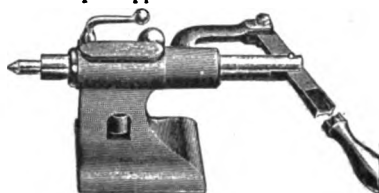


FIG. 784.

TAIL STOCK WITH LEVER MOTION.

Lever motion can be furnished with any of the Reed Hand Lathes, instead of Screw Feed, at the same price. Extra will be charged if both Lever and Screw are desired.

Fig. 785 has Combined Screw and Lever Feed for tail spindle; head spindle is hollow. It is a well made tool. Length of bed, 4 feet; between centers, 26 inches; swings, 11 inches; weight, 300 lbs. Price, \$57.00.

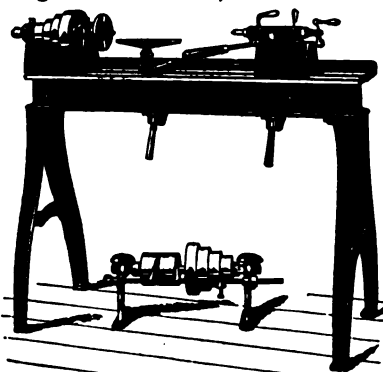


FIG. 785. WELLS' LATHE.

SUBSTITUTION.—We rarely substitute other articles for those ordered. Sometimes, in order to save time, and perhaps for other reasons, we may consider it an advantage to do this.

When we do, we always mean to send something as good, or better, and we wish our customers to understand that when we send other goods than those called for, we do so *at our own risk*, and we will pay all expense of changing if the goods thus sent are not satisfactory.

WOOD TURNING LATHES.

Some of the remarks in reference to Emery Grinders (page 248, third paragraph) are quite applicable to Wood Turning Lathes. We presume there are at least a hundred concerns making them.

The Lathes we show here are first-class in every respect. There are upwards of 300 of these Lathes in use in the largest furniture shops in the country, and they are preferred over all others. In Price they are somewhat higher than the common run of this class of machines, but the prices, quality considered, are reasonable.

The cut, Fig. 786, represents a New Improved Wood Lathe, designed for use with wooden shears. The head and tail stock are extra heavy, making it impossible to spring and bind the bearings, so they will heat (a fault with most lathes), which is overcome in this pattern. The small pulley on the cone is of iron, screwed on the spindle, the balance of cone is made of well seasoned cherry. The spindles are of steel with extra long bearings.

We furnish these Lathes with the following:

One Face Plate; 1 Set of Centers. 4 Rests, from 6 to 24 inches long; 2 Steps for holding rests, and a Steel Countershaft complete with Hangers, Cone, Tight and Loose Pulleys, Belt Shifter and Drip Cups.

We furnish the tail stocks with Wheel or Lever; in ordering, state which is preferred.

12 inch, complete,	\$39.25
14 " " "	43.00
16 " " "	46.50
18 " " "	51.75
20 " " "	59.00

We also furnish the Pattern or Double Head Lathes, for Pattern Making, Mold-

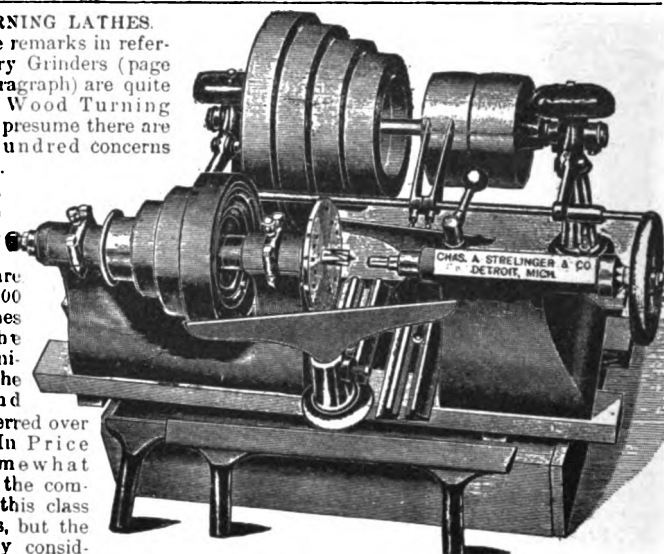


FIG. 786. WOOD TURNING LATHE.

ings, or large work (16 and 20 inch swing). These Lathes are provided with screws on both ends of the spindle, and 1 extra large Face Plate for the outer end of the spindle. The screws for taking up the end wear are held in removable brackets. When these brackets are taken off and the outer end of the spindles are used, the wear is taken up by bringing the tail center against the inner ends.

16 inch, complete,	\$51.75
18 " " "	59.00
20 " " "	66.00



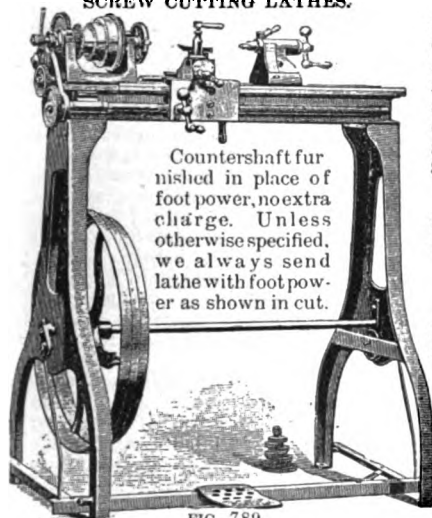
FIG. 787. LATHE HEAD.

Each Lathe has one spur and one round center.

No. 8 swings 8 inches. Price, complete, \$13.50.

No. 10 swings 10 inches. Price, \$18.00. Countershaft for 8 inch Lathe, \$9.00, for 11 inch Lathe, \$11.25.

SCREW CUTTING LATHES.



Countershaft furnished in place of foot power, no extra charge. Unless otherwise specified, we always send lathe with foot power as shown in cut.

FIG. 789.

8 INCH SCREW CUTTING FOOT LATHE.

The above cut represents the smallest Screw Cutting Foot Lathe we handle. While there are cheaper Screw Cutting Lathes offered in the market, we know of nothing that is sold at a less price than these that is really fit to work with.

Swing.	Price.	Between Centers.	Length of Bed.	Weight.
8 in.	\$58.90	20 in.	36 in.	250 lbs.
8 "	67.50	30 "	46 "	270 "

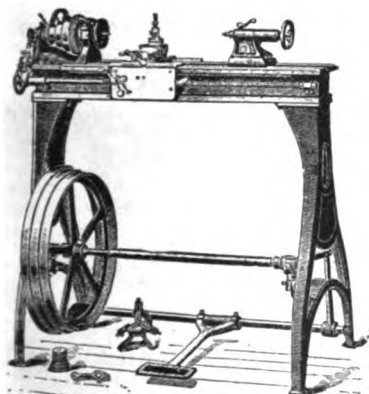


FIG. 790.

9 INCH SCREW CUTTING FOOT LATHE.

The 9 inch Lathe, Fig. 790, is neatly made, has hollow spindle, compound rest, center rest, hand rest attachment with long and short Ts; will cut screws from 6 to 48 threads; head spindle has a $\frac{1}{4}$ hole. When desired, we furnish countershaft instead of foot motion at same price. Countershaft for Fig. 789, \$8.00 extra; for Fig. 790, \$9.00 extra.

Swing.	Price.	Between Centers.	Length of Bed.	Weight.
9 inch,	\$67.00	24 in.	41 in.	300 lbs.
9 "	75.00	36 "	53 "	325 "

10 INCH SCREW CUTTING FOOT LATHE.

This Lathe, Fig. 791, swings 10 inches over ways, $7\frac{1}{2}$ inches over carriage. The head stock has a 3-speed cone for $1\frac{1}{2}$ inch belt; the back gear is thrown in and out by a cam, and the head spindle has a $\frac{1}{4}$ inch hole. The tail stock has an adjustable side movement for turning tapers. The carriage is gibbed to the bed, both front and back; is detachable for hand work; and can be thrown into feed instantly for turning or screw cutting. Carriage has both right and left hand movement.

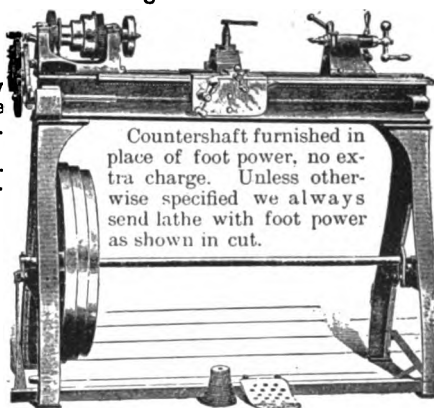


FIG. 791.

With each lathe we furnish a face plate, two pointed centers, wrenches and gears to cut all standard threads from 3 to 40; these gears may be so arranged as to cut an unlimited number of threads.

Swing.	Price.	Between Centers.	Length of Bed.	Weight.
10 inches,	\$85.00	28 in.	48 in.	425 lbs.
10 "	93.50	40 "	60 "	450 "
10 "	108.00	52 "	72 "	485 "

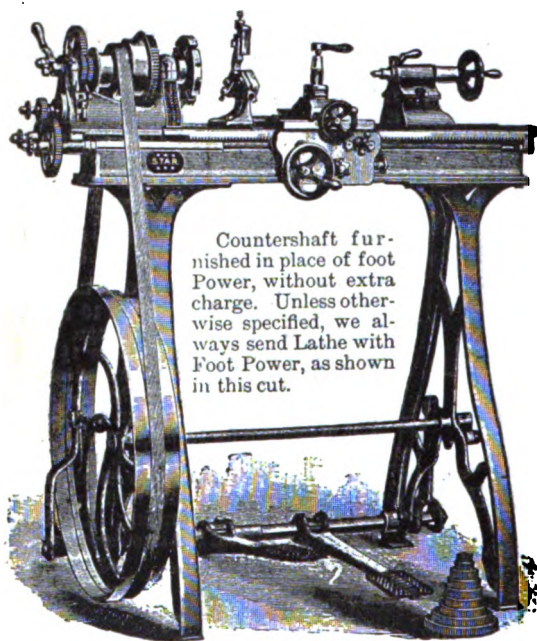


FIG. 792. STAR SCREW CUTTING LATHE.

This is a new and improved Back Geared Screw Cutting Lathe, with Automatic Cross-Feed, etc.

Nos. 1 and 2 swing 9 inches over ways, 5½ inches over tool carriage. Nos. 5, 6 and 7 swing 12 inches over ways, and 8 inches over tool carriage.

The Head Stocks of Nos. 5, 6 and 7 have a four-speed cone for 1½ inch belt, (and with the back gears give eight changes of speed); 1½ inch Hollow Steel Spindle, ½ hole. All head stocks have hard bronze metal boxes which are adjustable to take up the wear. The Tail Stock has an adjustable side movement for turning tapers.

It has patent feeding device, and is provided with both Automatic Cross and Longitudinal Feeds, which may be thrown in or out of contact, by turning a thumb nut in the apron, and will feed right or left, cut screws right or left, or be thrown out of gear entirely by moving the lever in the Head Stock, without changing the motion of the foot.

The tool carriage is strongly gibbed to the bed; the rest has an automatic cross feed, which will feed in or out; the tool post is provided with a screw adjustment for raising and lowering the tool.

It will cut threads from 3 to 64 inclusive, without compounding the gears, and any number of threads by compounding.

The lead screw is splined, and for all work except screw cutting, simply acts as a feed rod, and therefore the only wear on the threads of screw is in screw cutting. The lead screw and all working screws, as well as the rack and all small gears, are made of steel; the rack and all gears are cut by automatic machinery and run smoothly.

COMPOUND REST.

When desired, we furnish Compound Rest for boring taper holes, turning tapers, bevels, etc., as an

extra attachment to the Star Lathe. It will fit on to the carriage in place of the regular tool block, and can be easily put on or taken off as desired. Each Lathe has a Center Rest, two point centers, full set of change gears and wrenches complete.

PRICES AND DIMENSIONS.

Swing, in.	Price.	Between Centers, in.	Length of Bed, in.	Wgt. lbs.
9	\$76.50	25	43	325
9	85.50	36	54	350
12	148.50	36	63	660
12	162.00	48	75	700
12	175.50	60	87	740

Countershaft for 9 in. Swing Lathe, \$9.00

“ “ 12 “ “ “ 13.50

Compound Rest, 9 “ “ “ 13.50

“ “ 12 “ “ “ 18.00

Blocking to raise the 9 inch Lathes to swing 12 inches, \$9.00.

Blocking to raise the 12 inch Lathes to swing 16 inches, \$18.50.

SLIDE RESTS.

The Slide Rest is a desirable and necessary attachment to speed lathes for metal turning. The tool holding post may be drawn back and forth, or side-wise by means of screws, allowing any position for the turning tool. They are mounted on swivel bases, and can be set to any required angle.

Fig. 793 represents the Reed Slide Rest; this is made in sizes as per table below. All sliding surfaces are carefully fitted by scraping, and it is a superior tool.

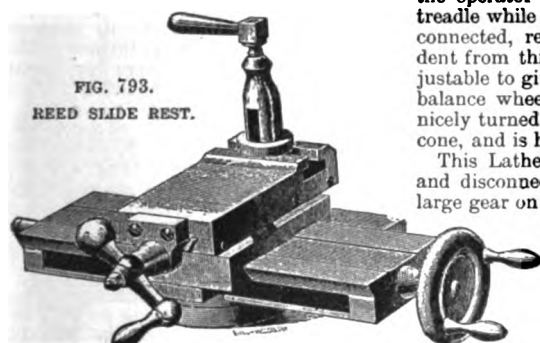


FIG. 793.
REED SLIDE REST.

Swing of Lathe.	Price.	Lgth. of Rest.
9 & 10 inches.	\$30.00	9 inches.
11 " 12 "	38.00	12 "
14 " 15 "	48.00	15 "
16 " 18 "	55.00	16 "

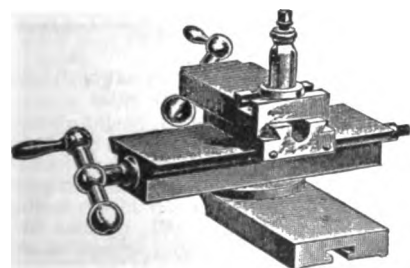


FIG. 794.
WILKINSON SLIDE REST.

Fig. 794 represents a Slide Rest, suitable for 10-inch Swing Lathe.

Price with Traverse Screw, fitted with handle for one end, \$18.00.

Price with Traverse Screw, with handle fitted for both ends. \$20.00.

F. E. REED & CO.'S LATHES.

In our judgment the Reed Lathes excel all others in their class; they are well made and of the best material; are stiff, strong, well proportioned and neat in appearance. The foot motion is of the most approved design. Treadle is made to slide on the square rocker shaft so it can be brought directly under the weight of the operator at any point desired, and secured in place by two set screws. The connection, between the treadle and crank is so arranged that if the foot of the operator should come under the treadle while in motion, the crank is disconnected, removing all danger of accident from this cause. The crank is adjustable to give the desired stroke. The balance wheel is ample in weight, and nicely turned to correspond with the lathe cone, and is hung in swivel bearings.

This Lathe has friction for connecting and disconnecting cone pulley with the large gear on spindle when back gears are used. The head spindle has a $\frac{1}{4}$ inch hole through it, and is furnished with a finished plunger for starting out the center. The screws that move tool block and tail spindle are graduated in such a way that they can be worked to $\frac{1}{16}$ inch without the use of calipers. It cuts right and left-hand threads from 6 to 48 per inch.

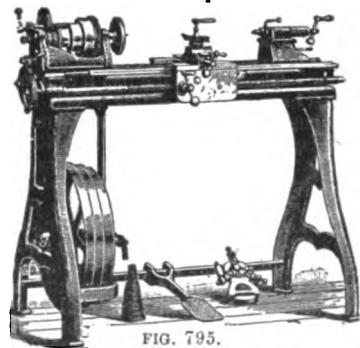


FIG. 795.

REED 10-INCH SCREW CUTTING FOOT
LATHE WITH PLAIN OIL REST.

Swing.	Price.	Bot. Centers.	Lgt. of bed.	Wgt.
10 in.	\$130.00	28 in.	48 in.	539
10 "	135.00	40 "	60 "	582

For list of attachments, see page 209.

Fig. 796 is made from the same general design as the larger Engine Lathes, and has all the advantages which they possess, besides many new features for lathes of this size, which make it specially

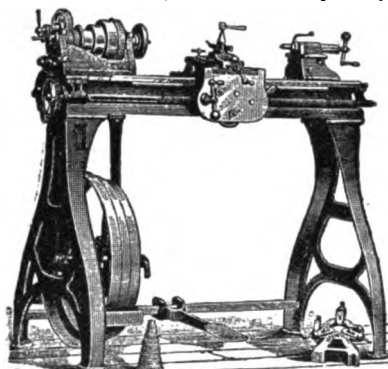


FIG. 796.

10 INCH SWING SCREW CUTTING FOOT LATHE WITH ELEVATING GIB REST AND PATENT FRICTION FEED.

adapted for fine and accurate work. It is made with the best of workmanship and material, all gear teeth are accurately cut, and run smoothly and quietly. The head spindle has a $\frac{1}{4}$ inch hole through it, and is furnished with a finished plunger for starting out the center. The cone pulley has three changes for $1\frac{1}{4}$ inch belt, and the back gears give six turns of the cone to one of the spindle, which gives ample power for any work the lathe will swing. The tail spindle has a bearing $4\frac{1}{2}$ inches long, and the screw which moves the spindle is graduated in such a manner as to be worked to $\frac{1}{16}$ of an inch without other measurements. The tail stock has a bearing of $6\frac{1}{4}$ inches upon the bed, and is securely held in position by a strong bolt in connection with a shoe under the bed. The rest is wide, and strong enough to take any cut the power in the head will give without spring or chatter, and is of the raise and fall form, with all the advantages of delicate adjustment for the cutting tool which larger lathes with this form of rest have, and is a decided improvement over all lathes of this size heretofore made with the plain flat rest, which makes it necessary to loosen the cutting tool to adjust it. The screw

which moves the tool block is so graduated as to be worked to $\frac{1}{16}$ of an inch without the use of calipers.

The feed gearing is driven from a slot in the leading screw in connection with a patent friction, and can be instantly engaged or disengaged at any desired point. It is simple in construction, positive in operation, cannot get out of order, and is so arranged that the thread of the leading screw is not used, consequently its accuracy for screw cutting is not impaired. The direction of feed is changed, or the feed gearing is disconnected by movement of the small lever shown on the end of the head stock. Change gears to cut from 6 to 48 threads to the inch; all necessary wrenches and center rest are furnished with the lathe.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
10 in.	\$150.00	28 in.	48 in.	560
10 "	155.00	40 "	60 "	600

For list of attachments, see page 209.

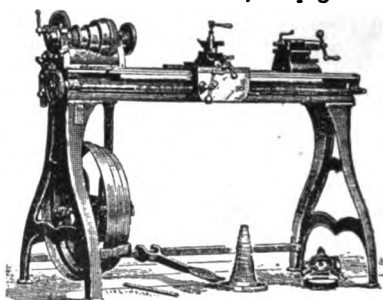


FIG. 797.

11 INCH SWING SCREW CUTTING FOOT LATHE WITH PLAIN GIB REST.

Head spindle is hollow, having a $\frac{1}{4}$ inch hole. The screws that move tool block and tail spindle are graduated to read to hundredths of an inch. The feed gearing is driven from a slot in the leading screw in connection with a patent friction, and can be instantly engaged at any desired point. It cuts right and left hand threads and feeds both ways. All gears are carefully cut and run smoothly.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
11 in.	\$150.00	24 in.	48 in.	660
11 "	154.00	36 "	60 "	730
11 "	158.00	48 "	72 "	745

For list of attachments, see page 209.

**REED 11 INCH SCREW CUTTING FOOT LATHE
WITH ELEVATING GIB REST AND
PATENT FRICTION FEED.**

With the exception of the tail spindle having a bearing 5 inches long, and the tail stock having a bearing of $7\frac{1}{2}$ inches upon the ways, the above Lathe will answer to the description of the 10 inch shown and described in Fig. 796.

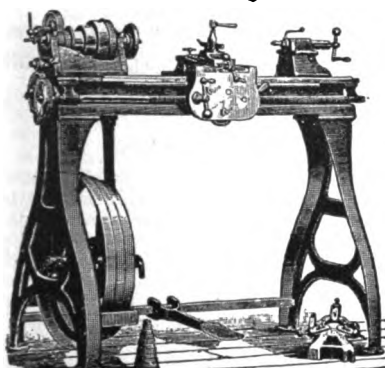


FIG. 798.

Swing, in.	Price.	Between Cent. in.	Lgth. of Bed, in.	Weight lbs.
11	\$165.00	24	48	700
11	170.00	36	60	745
11	175.00	48	72	780

**ATTACHMENTS FOR 10 AND 11 INCH SCREW
CUTTING LATHES.**

Large Slotted Face Plate, 9 inches in diameter, \$3.00.

Hand Rest Attachment for wood turning, \$2.00.

Spur and Female Centers for wood turning, each, \$1.50.

Screw Face Plate, \$2.00.

Spider Center for centering, \$1.50.

Crotch Center, \$1.50.

Blank Center for holding chucks, \$1.00.

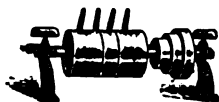
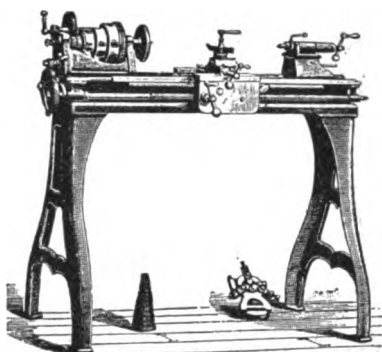


FIG. 799.

**COUNTERSHAFTS FOR 10 AND 11 INCH
SCREW CUTTING LATHES.**

We can furnish countershafts for the 10 and 11 inch lathes. Price for 10 Inch Lathe, \$12.00; for 11 Inch Lathe, \$15.00.



**FIG. 800. 10 INCH SWING ENGINE LATHE
WITH PLAIN GIB REST.**

The same description answers for this lathe as that used in connection with Fig. 795.

Swing, in.	Price.	Between Cent. in.	Lgth. of Bed, in.	Weight lbs.
10	\$130.00	28	48	500
10	135.00	40	60	525

Prices include countershaft, with tight and loose pulleys, 7 inches diameter by 2 inches face, which should make 200 revolutions per minute.

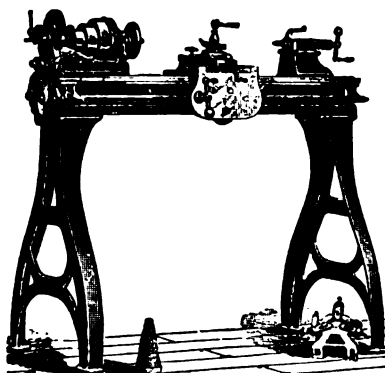


FIG. 801.

**10 INCH SWING ENGINE LATHE WITH ELE-
VATING GIB REST AND PATENT
FRICTION FEED.**

The same description answers for this lathe as that used in connection with Fig. 796.

Dimensions and prices on next page.

Dimensions and prices of 10-inch Lathe, Fig. 801.

Prices include countershaft which has tight and loose pulleys, 7 inches in diameter by 2 inch face, and should make 200 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
10 in.	\$150.00	28 in.	48 in.	500
10 "	155.00	40 "	60 "	525

For list of attachments, see page 209.

11 INCH SWING ENGINE LATHE WITH PLAIN GIB REST AND PATENT FRICTION FEED.

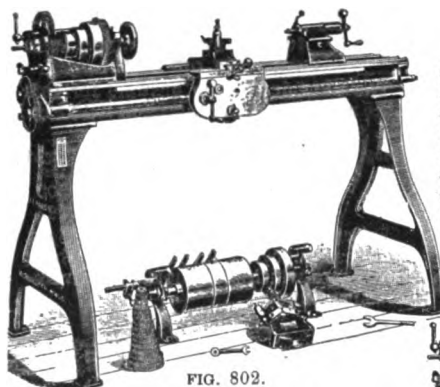


FIG. 802.

Head spindle is hollow, having a $\frac{3}{16}$ inch hole. The screws that move tool block and tail spindle are graduated to read to hundredths of an inch. It cuts right and left hand threads and feeds both ways. All gears are carefully cut and run smoothly. The feed gearing is driven by a slot in the leading screw in connection with a patent friction, and can be instantly engaged or disengaged at any desired point. It is simple in construction, positive in operation and cannot get out of order, and is so arranged that the thread of the leading screw is not used, consequently its accuracy for screw cutting is not impaired. The direction of the feed is changed, or the feed gearing is disconnected by movement of the small lever shown on the end of the head stock. Change gears to cut from 5 to 36 threads to the inch; all necessary wrenches and center rest are furnished with the lathe.

It is stiff and strong; well made in every particular, and of the best material.

Prices include countershaft which has tight and loose pulleys, 8 inches in diameter, $2\frac{1}{2}$ inch face, and should make 200 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
11 in.	\$154.00	36 in.	60 in.	700
11 "	158.00	48 "	72 "	740

For list of attachments, see page 209.

11 INCH SWING ENGINE LATHE WITH ELEVATING GIB REST AND PATENT FRICTION FEED.

The Lathe shown in following cut is made from the same general design as the Larger Reed Engine Lathes, and has the advantages which they possess, also many new features for lathes of this size, which make it specially adapted for fine and accurate work. It is made with the best of material and workmanship; all gear teeth are accurately cut, and run smoothly and quietly. The head spindle has a $\frac{1}{8}$ inch hole through it, and is supplied with a finished plunger for starting out the center.

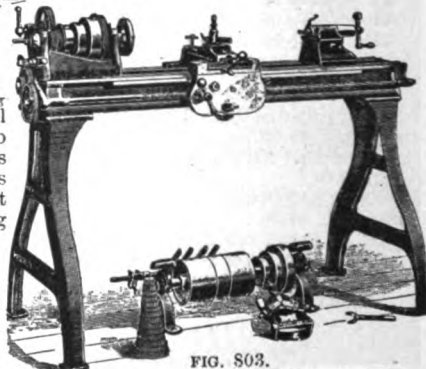


FIG. 803.

Prices include countershaft which has tight and loose pulleys, 7 inches in diameter, 2 inch face, and should make 200 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
11 in.	\$170.00	36 in.	60 in.	700
11 "	175.00	48 "	72 "	740

For list of attachments, see page 209.

F. E. REED & CO.'S ENGINE LATHES.

Within the past year, F. E. Reed & Co. have improved their standard line of Engine Lathes from 14 to 30 inch swing inclusive. While their former patterns were fully the equal of any corresponding sizes that could be found in the market, their desire to lead, impelled them to bring out new patterns for the entire line. And, we believe, they are a long way in advance of any Lathes of corresponding sizes in the country.

These Lathes are all made from new designs, and have larger bearings, deeper beds, and are heavier and better than ever.

All sizes from 16 to 30 inch swing are now made with five-step cone, instead of four-step.

Countershafts have patent friction pulleys that can be oiled while running, thereby saving loss of time, danger and annoyance in running off the belts, which is an important item where a number of Lathes are in use.

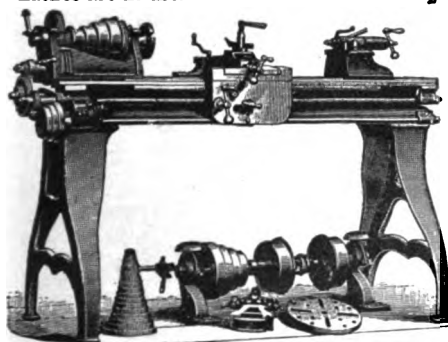


FIG. 804.

12-INCH SWING ENGINE LATHE, WITH ELEVATING GIB REST.

This Lathe is made with hollow spindle in the head. Diameter of hole, $\frac{1}{8}$ inch. Cone pulley has four sections, 7 $\frac{1}{2}$, 6, 4 $\frac{1}{2}$, and 3 inches diameter respectively, for a 1 $\frac{1}{2}$ inch belt. Steel rack and pinion for moving carriage. Steel leading screw, with open and shut nut. Cuts threads, 6, 7, 8, 9, 10, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 36, 38 and 40 to the inch. Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 28 to 280 cuts per inch.

Lathe is furnished with Elevating Gib rest, as shown in the cut, or it can be furnished with Plain Gib rest at the same price. Compound rest can be furnished at an extra charge. Taper Attachment can be furnished with Plain Gib rest only.

Lathe is not made with Power Cross feed. Countershaft has Patent Friction pulleys, 8 inches diameter for a 2 $\frac{1}{2}$ inch belt, and should make 180 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt. lbs.
12 in.	\$*	33 in.	5 ft.	930
Swings over elevating rest, 6 $\frac{1}{2}$ inches.				
" " plain			7 "	"

Extra length of Bed can be furnished at an extra cost of \$* per ft.

14-INCH SWING ENGINE LATHE, WITH ELEVATING GIB REST. (See Fig. 805.)

This Lathe is made with hollow spindle in the head. Diameter of hole, $\frac{1}{8}$ inch. Cone pulley has four sections, 8 $\frac{1}{2}$, 6 $\frac{1}{2}$, 5 $\frac{1}{2}$ and 3 $\frac{1}{2}$ inches diameter respectively, for a 2 inch belt. Steel rack and pinion for moving carriage. Steel leading screw with open and shut nut. Cuts threads 8, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32 and 36 to the inch. Independent rod and Patent Friction feed, with addition of Patent Variable feed, giving a range from 24 to 280 cuts per inch.

Lathe is furnished with Elevating Gib rest, as shown in the cut, or can be furnished with Plain Gib rest at same price. Compound rest can be furnished at an extra charge. Power Cross feed is furnished with either style rest.

Countershaft has Patent Friction Pulleys, 10 inches diameter. for 2 $\frac{1}{2}$ inch belt, and should make 140 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt. lbs.
14 in.	\$*	43 in.	6 ft.	1300
Swings over elevating rest, 7 inches.				
" " plain			8 $\frac{1}{2}$ "	"

Extra length of bed can be furnished at an extra cost of \$* per ft.

Prices include large and small Face Plates, Center Rest, Wrenches and Countershaft.

* Prices furnished upon application

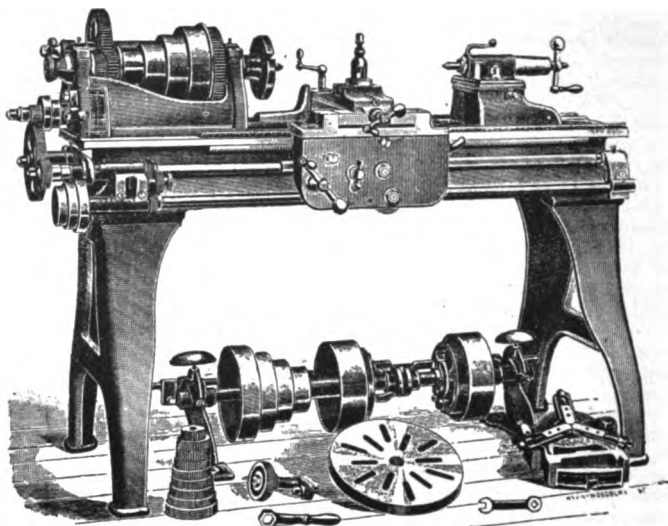


FIG. 805. 14 INCH SWING ENGINE LATHE WITH ELEVATING OIL REST.
For description see previous page.

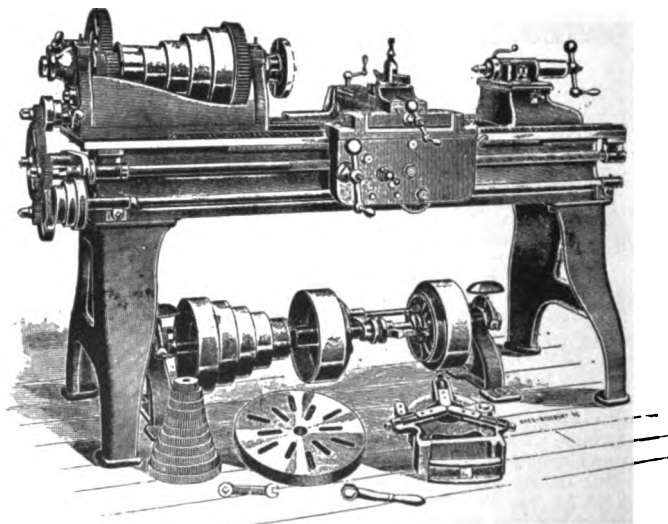


FIG. 806. 16 INCH SWING ENGINE LATHE WITH ELEVATING OIL REST
For description see following page.

14-INCH SWING ENGINE LATHE WITH ELEVATING GIB REST AND TAPER ATTACHMENT.

This Lathe is of the same design as that shown in Fig. 805, and described on page 211, except that it has taper attachment.

The bar for moving carriage on a taper is 24 inches long, resting on a bracket which is movable the entire length the lathe will turn. The bar is provided with a graduated scale and adjusting screws, so that boring or turning to any desired taper up to 3 inches to the foot can be accomplished without trial cuts.

It is the most positive and convenient form of taper attachment. It does not admit of lost motion, and the removal of a single bolt detaches the taper from carriage, leaving lathe free for ordinary work.

This Lathe can also be furnished with plain gib rest and taper attachment with power cross feed at the same price. Lathes with elevating rest and taper attachment do not have power cross feed. Extra cost for taper attachment, \$*.

16-INCH SWING ENGINE LATHE WITH ELEVATING GIB REST. SEE FIG. 806.

This Lathe is made with hollow spindle in the head. Diameter of hole, $\frac{1}{2}$ inch. Can be furnished with $\frac{1}{4}$ inch hole in spindle at an extra charge.

Cone pulley has five sections from 10 $\frac{1}{2}$ inches down for 2 $\frac{1}{2}$ inch belt. Steel rack and pinion for moving carriage. Steel lead screws with open and shut nut. Cuts threads, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22 and 24 per inch. Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 13 to 104 cuts per inch.

Lathe is furnished with raise and fall rest as shown in cut, or can be furnished with plain gib rest at same price. Compound rest can be furnished at an extra charge.

Power cross feed is furnished with either style rest. For taper attachment, see Fig. 807.

Countershaft has patent friction pulleys, 12 inches in diameter for 1 $\frac{1}{2}$ inch belt, and should make 120 revolutions per minute.

[14]

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
16 in.	\$*	33 in.	6 ft.	1,835

Swings over elevating rest 7 $\frac{1}{2}$ inches. Swings over plain rest 9 $\frac{1}{2}$ inches. Extra length of bed can be furnished at an extra cost of \$* per foot.

16-INCH SWING ENGINE LATHE WITH PLAIN GIB REST AND TAPER ATTACHMENT.

SEE FIG. 807.

This Lathe is of the design as described in opposite column under the heading of 16-inch Swing Engine Lathe, excepting that it has taper attachment, which is described at the top of opposite column. Extra cost of taper attachment, \$*.

18-INCH SWING ENGINE LATHE WITH COMPOUND REST. SEE FIG. 808.

This Lathe is made with hollow Crucible steel spindle in the head. Diameter of hole, $\frac{1}{2}$ inch. Head spindle is strongly back-geared. Cone pulley has five sections, the largest of which is 22 inches in diameter, for a 2 $\frac{1}{2}$ inch belt. Steel rack and pinion for moving carriage.

Rack gear can be drawn out of the rack, thus preventing wear on these parts when not required in screw cutting and other similar work. Steel leading screw with open and shut nut. Cuts threads, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18 and 20 per inch.

Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 37 to 9 cuts per inch, the regular speeds of feed being 42, 62 and 95 cuts per inch.

Compound rest is furnished with power cross feed. Rest is securely gibbed to outside of bed at front and back sides, with long bearings on bed. Plain rest can be furnished instead of compound rest if desired. This lathe is not made with elevating rest.

Countershaft has patent friction pulleys, 13 inches in diameter, for a 3 $\frac{1}{2}$ inch belt, and should make 120 revolutions per minute.

Swing.	Price.	Between Centers.	Length of Bed.	Wgt.
18 in.	\$*	51 in.	8 ft.	2,665

Swings over rest 10 $\frac{1}{2}$ inches. Extra length of bed can be furnished at an extra cost of \$* per foot.

*Prices furnished upon application, which will include large and small face plates, center rest, wrenches and countershaft.

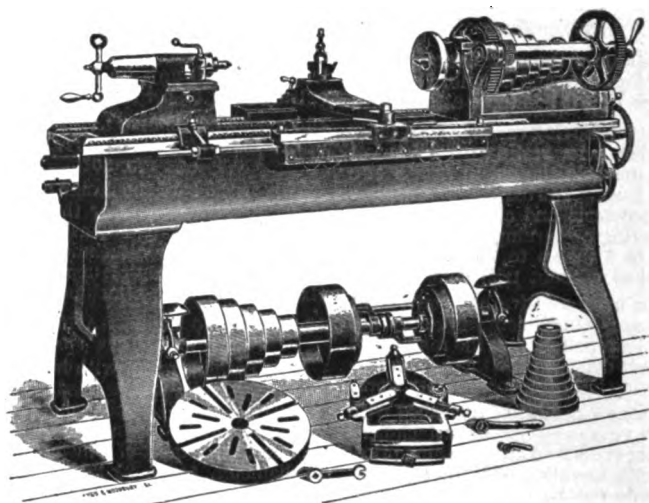


FIG. 807.

16 INCH ENGINE LATHE WITH PLAIN GIB REST AND TAPER ATTACHMENT.

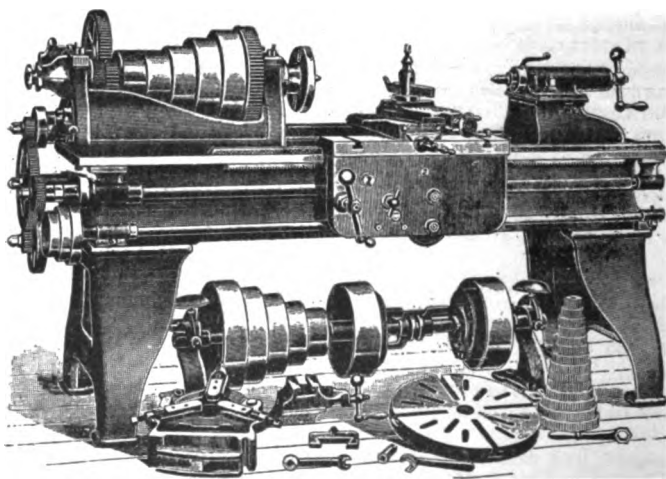


FIG. 808.

18 INCH SWING ENGINE LATHE WITH COMPOUND REST.

20, 22, 24, 27 AND 30 INCH REED ENGINE LATHES.

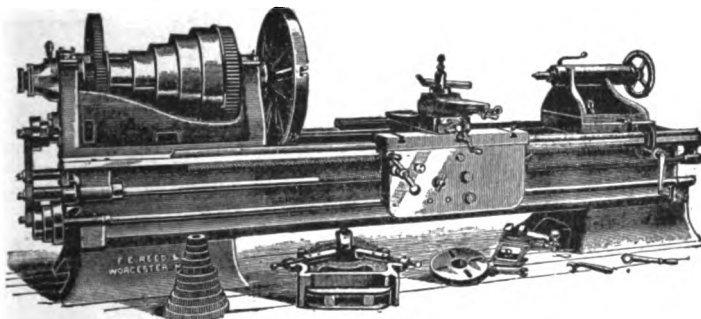


FIG. 809. 24 INCH SWING ENGINE LATHE.

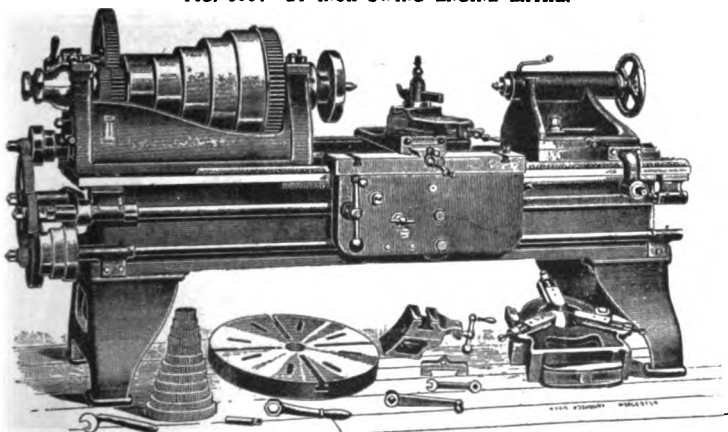


FIG. 810. 30 INCH SWING ENGINE LATHE.

The above named sizes of lathes will correspond to the description given of the 18 inch on page 213. All sizes from 20 to 30 inch swing are provided with a Side Tool Block, for turning work as large as the lathe will swing.

With these lathes are included large and small Face Plates, Center Rests, Screw Gears and Wrenches. We can furnish, at an extra price, Taper Attachments on the 20, 22 and 24 inch sizes.

20 INCH LATHE.

Price, \$*. Swing, 20 inches; between centers, 3 ft., 9 inches; length of bed, 8 ft.; weight, 3100 lbs.

22 INCH LATHE.

Price, \$*. Swing, 22 inches; between

centers, 5 ft., 9 inches; length of bed, 10 ft.; weight, 4050 lbs.

24 INCH LATHE.

Price, \$*. Swing, 24 inches; between centers, 7 ft., 5 inches; length of bed, 12 ft.; weight, 5035 lbs.

27 INCH LATHE.

Price, \$*. Swing, 27 inches; between centers, 6 ft., 6 inches; length of bed, 12 ft.; weight, 5860 lbs.

30 INCH LATHE.

Price, \$*. Swing, 30 inches; between centers, 6 ft.; length of bed, 12 ft.; weight, 7850 lbs.

Extra lengths of beds for above lathes at an extra cost of \$* per ft.

*Prices furnished on application.

BRASS FINISHERS' LATHES.

In the following few pages, we present a line of Brass Finishers' Tools, manufactured by the American Tool & Machine Co., of Boston. These tools have been on the market for many years, and are recognized as the standard machines in their class. For excellence of workmanship, quality of materials and finish, they cannot be excelled.

No. 2 Lathe, Fig. 811, swings 13 in.; has 5 ft. bed. Price, with plain Tail Stock, \$*.

No. 2 Lathe, with Back Motion, \$*.

No. 2 Lathe, with Dove Tail set over. Price, \$*.

The prices will include countershaft, as shown in cut, Fig. 811.

NO. 1 SQUARE ARBOR LATHE.

No. 1 Square Arbor Lathe, Fig. 813. swings 15 inches; bed, 5 ft. long; has Dove Tail set over, Swivel and Back Motions, Back Gears and Screw Apparatus. Price, complete, \$*. Hobs for cutting threads, including Cutter and Leader, per pair, \$*.

Deduct for Back Gears, if not wanted, \$*. Deduct for Screw Apparatus, if not wanted, \$*.

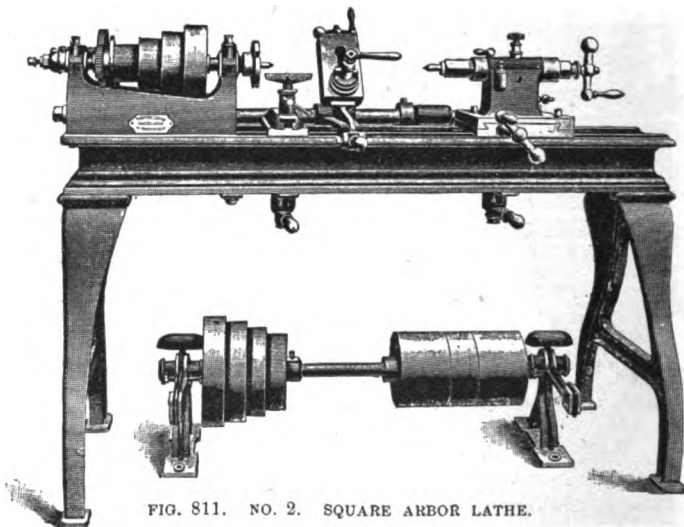


FIG. 811. NO. 2. SQUARE ARBOR LATHE.

No. 2 Lathe, with Dove Tail set over and Back Motion, Fig. 812.

The above prices include countershaft, as shown in cut, Fig. 812. When desired, we can furnish a countershaft, as shown in Fig. 811 (No. 2 Square Arbor Lathe), at an additional cost of \$4.00.

No. 3 Lathe swings 12½ inches; has 5 ft. bed. Price, with plain Tail Stock, \$*.

No. 3 Lathe, with Back Motion, \$*.

No. 3 Lathe, with Dove Tail set over. Price, \$*.

No. 3 Lathe, with Dove Tail set over and Back Motion, \$*.

Fig. 811, represents the No. 2 Square Arbor Lathe. This is a stiff, strong Lathe, particularly well adapted for drilling and tapping on small work, such as chandeliers, electrical goods and general brass work. The Screw Cutting Attachment makes it a very convenient tool.

Swings 13 inches; 5 ft. bed; complete with Screw Apparatus, Dove Tail set over and Back Motion. Price, \$*. Hobs, for cutting threads, including Cutter and Leader, per pair, \$*.

*Prices upon application.

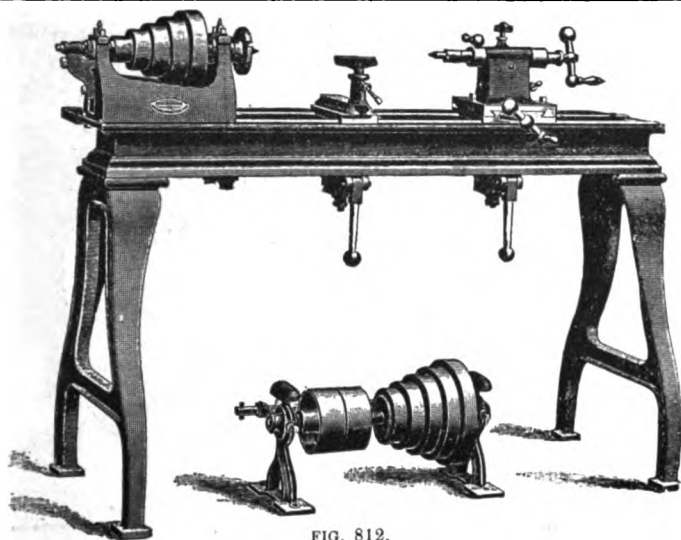


FIG. 812.

NO. 2. BRASS FINISHERS' LATHE.

For description, see page 216.

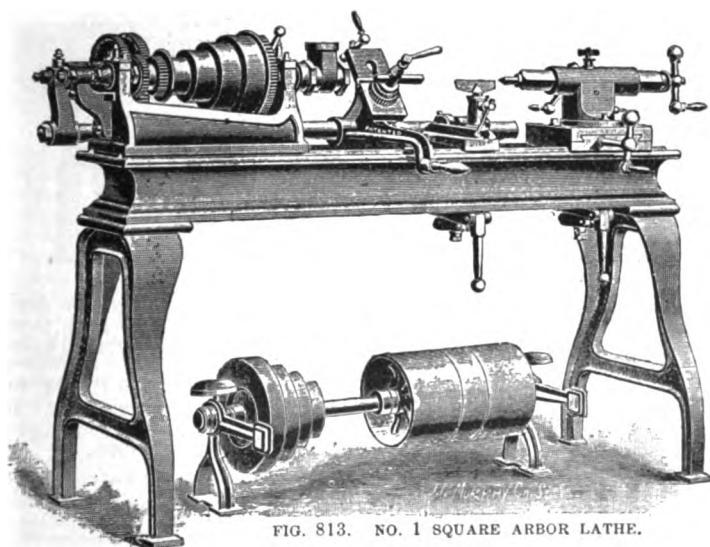


FIG. 813. NO. 1 SQUARE ARBOR LATHE.

For description, see page 216.

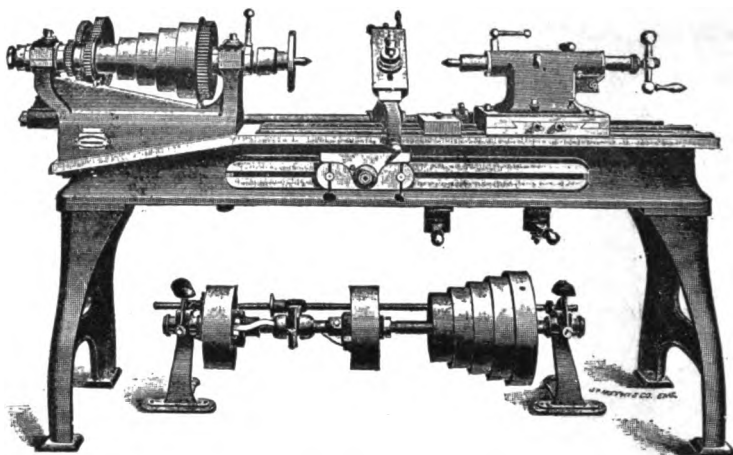


FIG. 814. NO. 1 IMPROVED LATHE.

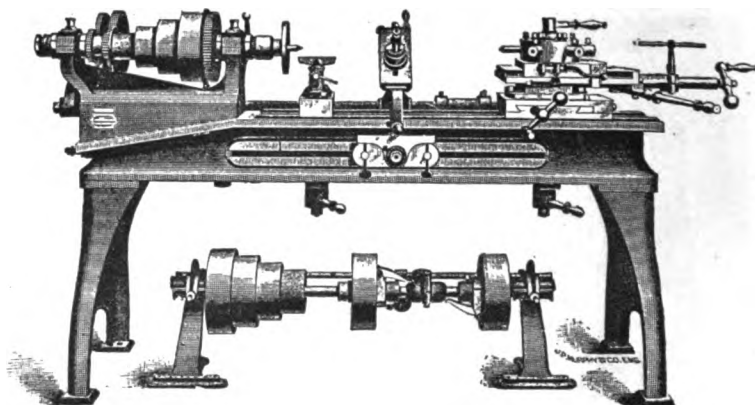


FIG. 815. NO. 2 IMPROVED TURRET LATHE.

NO. 1 IMPROVED LATHE.

By means of the inclined plane, the Head Stock can almost instantly be raised and lowered to a height to agree with that of the Tail Stock. Has taper attachments on front of the bed.

The Tail Stock has all the desirable features of the Square Arbor Tail Stock, Swivel, Back Motion and Dove Tail set over. The construction of the Spindle more effectually resists a tendency to partially rotate, (when boring is to be done with the spindle) than is effected even with

a square spindle, and is even superior to that, for when worn enough to produce chattering, it can be adjusted to its original degree of tightness.

Swings 17 inches, 6 ft. bed, hollow spindle with $1\frac{1}{4}$ inch hole, back geared, screw apparatus, swivel back motion and Dove Tail set over. Price, \$*.

NO. 2 IMPROVED TURRET LATHE.

We call attention to the improvements described herewith, which, with excellence of material and workmanship, make

*Prices on application.

this lathe especially desirable for brass work of all kinds, and for medium iron work. By means of the inclined plane, the Head Stock can almost instantly be raised and lowered, as may be required, to a height to agree with that of the Tail Stock. This feature will be appreciated by all who are aiming to do their work well and rapidly.

The Journals are large and run in self-oiling bronze boxes that are fitted with arrangements for adjusting, by which the

Swings 13 inches, bed 6 ft. long, hollow spindle with $1\frac{1}{4}$ inch hole, back gears, screw apparatus, and taper attachment, Price, \$*.

PLAIN TURRET LATHE.

(Not illustrated.)

This is designed for use on Chuck and Rod work of every description. By means of the inclined plane, the Head Stock can almost instantly be raised and lowered to a height to agree with that of the Tail

Stock. This feature is a desirable one, and will be appreciated by all who are aiming to do their work well and rapidly. The live spindle is made of special steel which is very hard and close grained.

The Journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting, by which the spindle can be kept to a perfect running fit; and all held so rigidly that shaking is impossible. We have overcome the principal objection to hollow spindle lathes, by providing a thrust bearing that continually runs in

oil, and thus the spindle is relieved of the great friction and wear it has heretofore been subjected to. Price, \$*

VALVE MILLING MACHINE.

There are two sizes of Valve Milling Machines made.

No. 1 measures $5\frac{1}{2}$ inches between cutters, and $3\frac{1}{4}$ inches from top of Elevating Spindle to center of cutters. Price, \$*. Weight, 800 lbs.

No. 0 measures 13 inches between cutters, and 10 inches from top of Elevating Spindle to center of cutters. Price, \$*. Weight, 1,335 lbs.

TORN CATALOGUES.—Every article in this catalogue is very plainly described, either by figure, number, regular number or name; and we beg our customers not to cut or tear out pages, or parts of pages, as this mutilates the book, and when done to any extent, destroys it for reference.

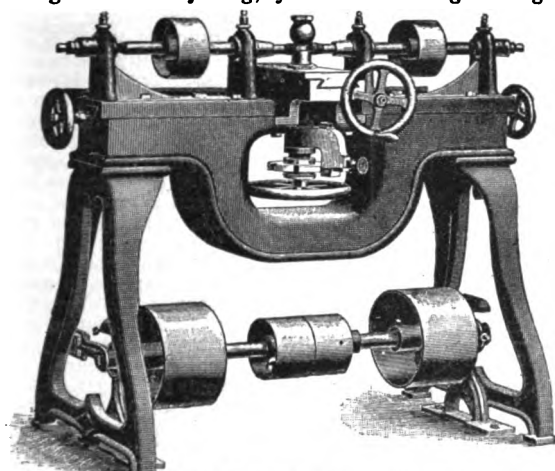


FIG. 816. NO. 1 VALVE MILLING MACHINE.

spindle can be kept to a perfect running fit; and all held so rigidly that shaking is impossible.

The Taper Attachment on the front of the bed, is an addition that will be appreciated by all who have had taper threads to cut with Screw Apparatus, as the guide bar can be set accurately and quickly.

As the Head Stock can be adjusted to compensate for all downward wear of the Tail Stock, and the Turret Head has swivel and set over, it is possible to secure a perfect alignment of center in every direction at will of the operator, allowing perfect work to be done at all times.

The cutting tool can be fed into the work by the lever or by the screw, and the change from one to the other can be made in a moment by turning the wrench near the Turret Head.

Monitor Lathes are extensively used in the manufacture of brass goods, and a great variety of other articles where several operations are required to finish a piece. The work to be done is usually

Hardened and Ground Collars between spindle collar and box, and between adjusting nut and box. Index ring, lock bolt and other parts subjected to severe wear, are made of hardened tool steel.

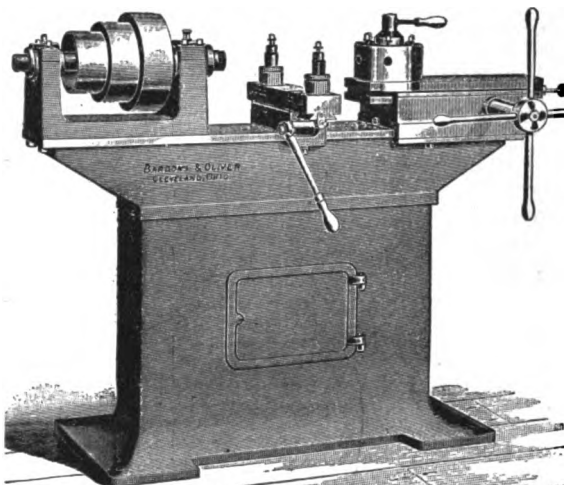


FIG. 817. MONITOR LATHE.

held in an Automatic Chuck (see Fig. 820), Box Chuck, or a Revolving Jaw Chuck (see Figs. 406 and 413). The special tools are arranged in the Turret in their proper order, so that each in turn is presented to the piece being made. Valve Spindles are taken in the rough casting, and finished with thread complete at one operation.

We make a specialty of equipping these machines with all necessary small tools and fixtures, and will at any time estimate on capacity of machines and probable cost of tools for any special work.

We call especial attention to the following points in these tools:

The Column Support gives almost absolute firmness and rigidity, and perfect alignment of spindle and turret under all conditions.

The Spindle Boxes are of phosphor bronze made in halves, and easily renewed by any good lathe hand. End thrust of spindle taken on front end of front box, and lost motion taken up by nut at rear end of same box.

Turret revolves automatically; its center bearing being of steel hardened and ground. Provision is made for oiling this bearing through the stud.

The Vertical Adjustment of turret is obtained by means of taper frame between the saddle and top of bed, and the alignment of turret slide side-ways is preserved by taper gibs, extending to extreme front end of saddle, and adjusted entirely at back end.

An Automatic Chuck can be applied to these lathes, which allows the work to be gripped and released without stopping the machine. It

can be adapted not only to round, hexagon and square rods and tubes, but also to pieces of almost any shape.

An Automatic Feed to Turret Slide can be applied to the 15, 17 and 19 inch machines.

The Index Ring is made of tool steel, hardened.

The six holes in the turret are usually $1\frac{1}{2}$ inches in diameter; but these, as well as the thread on the end of spindle, can be made to suit the needs of the purchaser.

Chasing Attachments and Set-over Turrets can be fitted to all of these lathes.

Swing.	Diam. of Hole in Spindle	Diam. of Turret	Diam. of Holes in Turret.	Center of Hole in Turret to top of Slide.	Length that can be Milled.	Length of Bed.	Distance from Spindle end to Face of Turret.	Shipping Wt. about.
11	$1\frac{1}{8}$	$5\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	42	15 in.	750
13	$1\frac{1}{4}$	6	1	2	$5\frac{1}{2}$	50	18 "	1000
15	$1\frac{3}{8}$	$7\frac{1}{2}$	$1\frac{1}{2}$	2	6	58	22 "	1300
17	$1\frac{1}{2}$	9	$1\frac{1}{2}$	3	9	66	25 "	2000
19	$1\frac{3}{4}$	11	$1\frac{1}{2}$	$3\frac{1}{2}$	11	78	29 "	2700

*Prices upon application.

SECOND-HAND MACHINERY.

POINTERS ABOUT SECOND-HAND MACHINERY.

Pointers about Second-Hand Machinery. "While it is one of the most risky things in the business to make a wise selection in second-hand machinery, valuable points may nevertheless be gained from the study of the stock of a large number of second-hand dealers. It is possible that all firms who use good machines are not prosperous, but it is a noteworthy fact that most all prosperous firms use good machines. The second-hand dealer's stock is mostly derived from unfortunates in business, and this class is noted for poor judgment of tools; poor tools are too often the cause of their downfall. One good recommendation of a machine is the fact that you can seldom or never find it in a second-hand dealer's stock. If he should get hold of it he can sell it immediately, but, as a rule, it is bought up before he can get it. Ask a well-posted second-hand dealer to tell you the names of the makers whose machines are rarely in his possession, and you will find that these are famed for the excellence of their productions."

Good Tools Go Quick.

We do not handle **SECOND-HAND MACHINERY**—that is, we do not mean to. Doing a large business in Machinery, there are occasions when we find ourselves with a few Machines on hand for some reason or other, and we always sell them at home.

The terms used by **Very Ambiguous.** Second-hand Tool dealers in classifying Machinery and Tools, are something like this: "GOOD AS NEW", "A-1 CONDITION," "IN PERFECT ORDER," "IN FAIR CONDITION."

We never saw an announcement of Second-hand Tools in which any tool was named as being worse than the last term, "In Fair Condition", and yet we have seen in second-hand stocks, many tools that this term would flatter highly.

Original Quality Counts. Very much depends on what the quality of the tool was when new, and what sort of usage it may have had. We would rather have a machine of the BROWN & SHARPE, PRATT & WHITNEY, or F. E. REED make, that had been used carefully for five years, than a new tool of many of the second and third-class makes.

During the past eight or ten years there has been greater progress made in the perfecting and development of Machine Tools than ever

The above article, found in a mechanical journal, is both sensible and suggestive.

before. Wideawake manufacturers have seen the great advantages of putting in improved machines, and this has resulted in placing upon the market hundreds of "back-number" tools and machines.

THERE IS ONE PIECE OF ADVICE WE WOULD GIVE TO PROSPECTIVE BUYERS OF SECOND HAND MACHINERY, AND THAT IS, NEVER BUY SECOND-HAND MACHINERY OR TOOLS UNLESS YOU CAN SEE AND INSPECT THEM.

If the Machines or Tools are of too small importance, as regards amount invested, to pay for the expense of an investigation, it is better to pay a little more, and buy of a reputable dealer who will fully guarantee them.

If the Machines or Tools are larger, therefore of greater importance, it is unwise to take chances, and the time and money spent in investigation will be well repaid.

MASTER MECHANIC'S REPORT.

**Report
Master
Mechanic
Association.**

At the twenty-seventh annual convention of the American Master Mechanics' Association held at Saratoga, N. Y., this year, a committee consisting of Messrs. T. W. Gentry, Geo. L. Potter, H. D. Gordon, G. R. Joughins, Wm. Swanston, and F. B. Miles, made a very interesting report on "SPECIAL SHOP TOOLS", a portion of which we print here.

"In collecting the data for this report, we have been careful to get the views and opinions of members as to the introduction of improved methods and interchange of ideas, with a view to having all the members of our association profit by the work of this committee. We are much pleased with the result.

The experience gained by your committee in following their subject enables them to make some suggestions, which we hope may be kindly considered, and while most of our

members, being familiar with, may have taken advantage of them already, there are no doubt large numbers who have not done so, because their shops are small and means limited, and while standing more in need of cheap and simple means of getting out an increased amount of work, than many others better provided, they hold back on account of small expense to be incurred, or because they are afraid it will not pay in small shops, and for other reasons, none of which your committee think will hold good.

We find much attention has been paid to the working of PORTABLE UNIVERSAL DRILLING AND BORING MACHINES; they are, in fact, indispensable in the larger shops, and in any shop that handles even a few modern engines a month, they can be made to pay largely. Some of our members have apparatus made for them, but there

**See Pages
108 to 109.**

are on the market several excellent portable drilling devices, some operated by power from the shop shafting, in shape of ropes, sheave pulleys, flexible shafts, etc., others driven by steam and compressed air.

See Pages 410 to 418. Your committee were pleased to find that the use of convenient

Hoists is more general than they had reason to expect, yet they are by no means as well introduced, as their merits as labor-saving devices demand. With safe and convenient appliances for hoisting work at lathes, planers, drill-presses, etc., a large amount can be saved not only in handling and chucking, but the machines themselves can be kept going more steadily, and the risk of accidents to employes greatly lessened. We find compressed air is being used by a large number of our members for this purpose, in connection with pneumatic cylinders. Others, by con-

See Page 417. structing suitable overhead ways, use differential or safety chain hoists to great advantage, and get all the necessary movement for taking work from floor, swinging it into position for chucking and handling, frequently dispensing with a helper or laborer at the machines. We find that some of our members have cheap and convenient cranes at their larger machines, to which are attached either pneumatic or chain hoists by which work, heretofore very costly to handle, is easily placed in position. These hoists are also used in erecting shops, and in the yards for load-

ing and unloading, and in many larger plants, compressed air is used for raising cars, in removing trucks, applying wheels, etc. We strongly recommend the introduction of cheap and reliable hoists for general use at heavy machine tools, and members

This Is Strongly Indorsed.

can get all necessary information from our list, in regard to those in use in railroad shops, and we find there are quite a number of such appliances manufactured by the well known makers of pneumatic, hydraulic, and other forms of cranes and hoists, and there are several builders of machine tools and railroad shop specialties that make a cheap and reliable hoist. *Members desiring to get full capacity of their machine tools, and reduce liability of accidents to employes, and save wages of helpers and laborers, should give this important item in shop practice the fullest consideration.*

Among special shop tools that are not very generally used, mostly because their value is either underestimated or their better qualities little understood, are the best designs of patented small Lathe Tools.

We refer to those tools so made, tempered and set in stocks or holders as to prevent the necessity of dressing and shaping, but that always present a proper cutting edge, by grinding the dulled point only. Such tools are cheap compared to the immense quantities of high-priced tool steel, cut up monthly for small lathes, those for

See Pages 225 and 226.

threading, cutting-off and light inside boring being especially handy and economical and insuring good work, while the more substantial, such as diamond points, round nose, square, etc., save time at light machines; this is particularly true of small lathes in tool rooms. We do not recommend these tools for heavy work on any class of machines. The small tool departments of a few of the best special tool-makers can give some interesting information in regard to such tools, and no doubt some of our members can. We are aware that the market contains a number of them that are almost worthless; but there are good ones to be had.

See Pages
227 to 230.

We find the matter of convenient and accurate LATHE MANDRELS has not received the attention it should in most repair shops, and instead of the gradual introduction of good "expanding" mandrels, a majority of shops are still depending on the old solid mandrel in its most temporary form, and some shops have a ton of them which, if put at their actual cost, would purchase a full set of the best expanding mandrels, and if sold for NO. ONE

Put 'em
in the
Scrap File.

WROUGHT IRON SCRAP, would go far towards the cost of enough of them, to take the place of about all their old mandrels. Since a number of our members

have called attention to an expanding lathe mandrel in daily use by them, and recommend it so highly, and from the fact that a reliable tool of this kind is difficult to obtain at reasonable prices, and many of our members having experience with some very poor devices of this sort, your committee have decided to mention the "NICHOLSON EXPAND-

DING LATHE MANDREL" as probably the best of which they have knowledge, and

as having been mentioned by all the members who touched on this subject in their contributions to the committee work.

The rapid introduction of self, or air-hardening tool steel, has caused the retirement of the old-style grindstone as a means of sharpening large machine tool cutters, etc., and the substitution of heavy emery grinders has proven, wherever tried, a paying investment, those styles of grinders designed to use water plentifully on the wheel have shown their superiority over the dry wheels.

See
Page 258.

There is a very convenient double form of these grinders with one coarse and fine-grained wheel set in same frame, and it is found that the smallest tools can be finely ground without injury to temper. We suggest to those of our members who have never used them, to inquire into their merits as compared to old style grindstones."

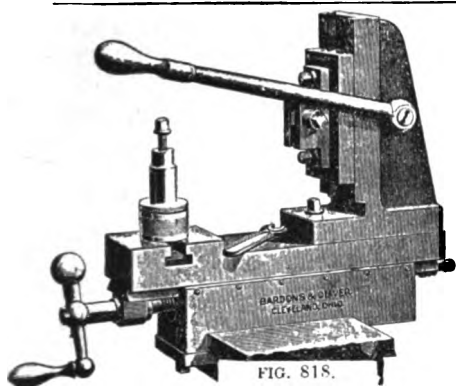


FIG. 818.

BARDONS VERTICAL FORMING TOOL SLIDE.

The old method of hand-tooling irregular shapes in the brass shops has been giving way in the past few years to a much quicker and better method, by means of a forming tool variously operated.

This forming tool has its upper face sharpened to correspond to the contour of the finished work, the end of the tool having a cutting edge which tangentially engages the revolving blank to be formed.

The distinctive feature of the above device is the fact that the tool slide is vertical instead of horizontal. Among the advantages of this method of mounting the tool, are increased capacity of the lathe, ease of adjustment, and the allowing of two or more cuts to be taken on a piece if it is not finished sufficiently by the first cut.

The forming tool is securely clamped to the holder by means of a dove-tail on the back, the lower end of the tool being made on an angle to give a shearing cut to the work.

The tool being placed in position, is brought forward to such a position as will give the proper diameter to the piece to be formed. The stop screw at the rear end of the slide is then adjusted to conform to this position; then, by lowering the slide, the tool engages the rear side of the revolving work. A slight movement of the ball-handle before raising lever carries the tool away from the work, preventing any marring of the finest surface. If one cut is found to be too heavy, the tool may be backed off a trifle and two or more cuts may then be made.

These Attachments are designed especially to use on the Bardons & Olivor Monitor lathe, in place of the Cut-off, but they can be fitted to any make of lathe, at slight additional expense.

SEMI-AUTOMATIC VALVE MILLING MACHINE.

Designed for the rapid finishing of the hexagon parts of small and medium size Brass goods; such as Nuts, Valve Bonnets, Oil Cups, Gauge Cocks, etc.

It differs from the old style machines mainly, in having an Automatic Indexing Arrangement to the vertical spindle; Lever Motion to the slide; Convenient Adjustment to the vertical spindle on the top of the slide; Column Support securing freedom from vibration under high speeds, preserving alignment of spindles, and forming a convenient place for tools, cutters and fixtures. It has a capacity on the class of work for which it is designed, of at least double that of the old style hand-indexing, screw-feed machines.

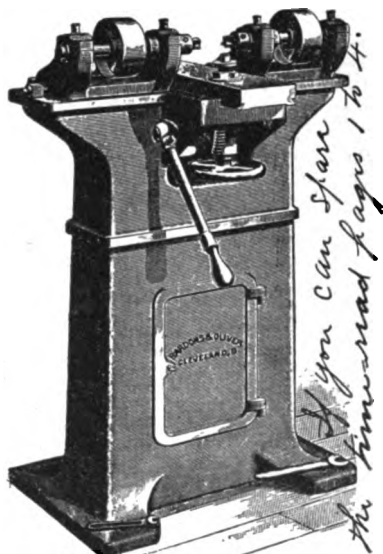


FIG. 819. VALVE MILLING MACHINE.

Greatest working distance between ends of cutters, 3 inches; greatest distance from center of cutter to top of vertical spindle, $1\frac{1}{2}$ inches; diameter of cutter, $\frac{1}{4}$ inch.

TURRET MACHINES.*

The use of Revolving Head, or Turret Machines, is constantly increasing, as manufacturers are coming to realize the great advantages gained by these machines over the old methods of lathe work, especially where large quantities of small pieces are to be produced, and, indeed, within the past few years, machines of this class have been developed for a range

screws, though the most common, is but one of the many uses to which they can be applied. They are especially adapted to the manufacture of studs and bolts, and numerous other articles requiring several operations.

The description of Monitor Lathes, on page 290, will serve, in a general way, as a description of the construction of the Bardons & Oliver Screw Machines.

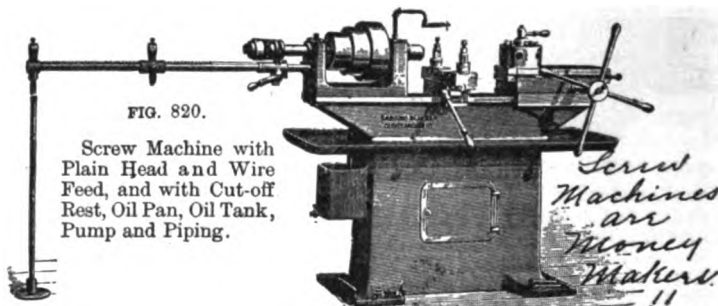


FIG. 820.

Screw Machine with Plain Head and Wire Feed, and with Cut-off Rest, Oil Pan, Oil Tank, Pump and Piping.

of work, and of capacities such as would not have been dreamed of ten years ago.

The Quint Turret Drill, shown on page 113, is, we believe, a new adaptation of the Turret.

Besides the more commonly known Screw Machines and Monitor Lathes, there are Chucking Lathes, Vertical Chucking Machines, and many other styles of machinery in which the Revolving Turret is used.

SCREW MACHINES.*

Fig. 820 represents what is known as a Screw Machine. The manufacture of

The Wire Feed allows the rod or bar, from which the screw or other piece of work is being made, to be released, fed forward to a stop, and gripped while machine is running.

One Collet with round hole is furnished with Wire Feed for each machine. When ordering, state size of Collet desired.

Special Collets can be made to fit pieces of almost any shape. Prices on these quoted upon application.

We make a specialty of equipping these machines with all necessary small tools and fixtures, and will at any time estimate on capacity of machines and probable cost of tools for any special work.

CAPACITY AND PRINCIPAL DIMENSIONS OF SCREW MACHINES.

No.	Diam. of Hole in Spindle.	Diam. of Hole in Wire Feed.	Diam. of Turret.	Diam. of Holes in Turret.	Length that can be Milled.	Length of Bed.	Spindle to Face of Turret.	Largest Square Stock without Wire Feed.	Largest Square Stock with Wire Feed.	Weight, with Wire Feed.
2	$1\frac{1}{8}$	$1\frac{1}{8}$	$5\frac{1}{2}$	$1\frac{1}{8}$	$4\frac{1}{2}$	42	15	$1\frac{1}{8}$	$1\frac{1}{8}$ in.	900 lbs.
3	$1\frac{1}{4}$	$1\frac{1}{4}$	$6\frac{1}{2}$	1	$5\frac{1}{2}$	50	$18\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$ in.	1900 "
4	$1\frac{3}{8}$	$1\frac{3}{8}$	7	$1\frac{1}{2}$	6	58	22	$1\frac{3}{8}$	$1\frac{3}{8}$ in.	1600 "
5	$1\frac{1}{2}$	$1\frac{1}{2}$	9	$1\frac{3}{4}$	9	66	25	$1\frac{1}{2}$	$1\frac{1}{2}$ in.	2200 "
6	$2\frac{1}{8}$	$1\frac{1}{2}$	11	$1\frac{1}{2}$	11	76	29	$1\frac{1}{8}$	$1\frac{1}{8}$ in.	3000 "

*Prices for above Machines furnished on application.

TOOLS FOR TURRET MACHINES.

Among the tools commonly used for Turret Machines, are the Finishing Box Tools, both plain and adjustable; Roughing Box Tool; Tap and Die Holders; Cutting-off Tool; Collet Chucks, etc., etc. These tools are made in great variety. Prices named upon application.

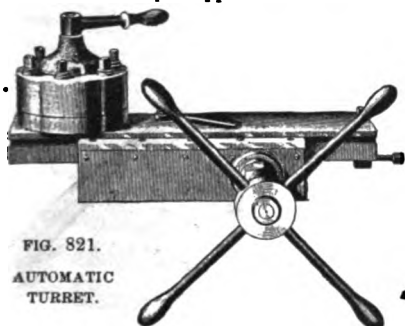


FIG. 821.

AUTOMATIC
TURRET.

We are prepared to furnish a number of sizes of Turrets, that can be fitted to any make of lathe. In order to fit these, we require templet fitted to V's of Bed, and with position of center marked. Will be pleased to name prices upon receipt of information as to what is wanted.

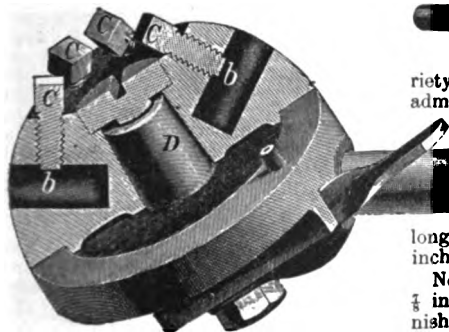


FIG. 822. TURRET HEAD TOOL.

This is a very desirable tool; is usually used in Tail Stock of Lathe. It will hold six different tools, and is made of first-class stock, with good workmanship.

For those who do not have work enough of this character to warrant the investment in a high priced machine, it serves as an excellent substitute, at a moderate price.

The uses which can be made of a tool of this character will readily suggest themselves, while its general construction will be understood from the engraving.

No. 1, \$13.00. Diameter, $3\frac{1}{4}$ inches; weight, $3\frac{1}{2}$ lbs; holes are $\frac{1}{2}$ inch diameter and 1 inch deep.

No. 2, \$25.00. Diameter, $5\frac{1}{2}$ inches; weight, 14 lbs.; holes are $\frac{1}{2}$ inch diameter and $1\frac{1}{2}$ inches deep.

SMALL TURRET TOOLS.

We present herewith, a line of small tools, which can be used to good advantage in any lathe, either foot or power. These tools are well made and quite reasonable in price. They are especially adapted for use in the No. 1 Almond Turret tool, and have $\frac{1}{2}$ inch shanks. Any of these tools can be sent by mail at very little expense for postage.



FIG. 823.



FIG. 826.



FIG. 824.



FIG. 827.



FIG. 825.

The End Cutting Hollow Mills, Fig. 823, are made in great variety; the teeth have proper clearance and admit of grinding back $\frac{1}{2}$ to $\frac{1}{4}$ inch. They are provided with taper hole at back end, and can be used in any Lathe.

No. 0, \$1.00 each, are made from stock $\frac{1}{2}$ inch diameter, and $1\frac{1}{2}$ in. long. Furnished in any size from $\frac{1}{2}$ to $\frac{1}{4}$ inch.

No. 1, \$1.25 each, are made from stock $\frac{1}{2}$ inch diameter; $1\frac{1}{2}$ inches long. Furnished in any size from $\frac{1}{2}$ to $\frac{1}{4}$ inch.

No. 2, \$1.75 each, are made from stock $1\frac{1}{2}$ inches diameter; 2 inches long. Furnished in any size from $\frac{1}{2}$ to $\frac{1}{4}$ inch.

Holders for Hollow Mills, Fig. 824, No. 0, 35 cts.; No. 1, 50 cts.; No. 2, 75 cts.

The Stop Gauge, Fig. 825, is used for determining the lengths of screws, etc. Price, each, 50 cts.

The Die Holder, Fig. 826, is so constructed that it will cut threads to a given

point, and revolve with the work when that point is used. This holder is suitable for the No. 0 Dies on page 144. Price, without dies, \$4.00.

We furnish a Tap Holder made on the same principle as the Die Holder, to release automatically when holes are tapped the desired depth. This holds taps with $\frac{1}{4}$ inch shank. Price of holder, \$3.00.

The Box Tool, Fig. 827, is used for taking off stock and turning to size in making studs and screws from round rod. The back end is made to fit the No. 1 mill holder; the front end is fitted with a bushing that in all cases is adapted to the size of rod used. The cut can be set to cut from $\frac{1}{4}$ inch stock down to any desired size at one cut. Each tool is furnished with one bushing and one cutter. Price, including one holder as shown in cut, \$4.00.

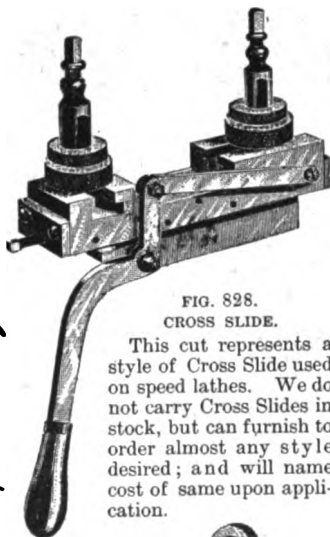


FIG. 828.
CROSS SLIDE.

This cut represents a style of Cross Slide used on speed lathes. We do not carry Cross Slides in stock, but can furnish to order almost any style desired; and will name cost of same upon application.

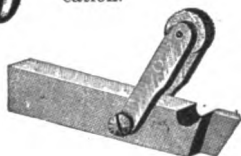


FIG. 829.

Fig. 829 is a Combined Cut-off and Knurling Tool, which can be used in the Cross Slide or in Tool Post. Price, \$2.00.



LATHE TOOLS.

PLANER AND SHAPER TOOLS.

FIG. 830.

The above cuts represent full sets of both Lathe and Planer tools. These are forged from the best English cast steel, tempered and ground with special care and ready for use. Following is a list of prices, sizes and shapes.

Size.	Per Set of 12.	Each.
$\frac{1}{4}$ x $\frac{1}{4}$ inch.	\$ 2.40	\$.25
$\frac{3}{8}$ x $\frac{3}{8}$ "	3.00	.30
$\frac{1}{2}$ x $\frac{1}{2}$ "	3.00	.30
$\frac{3}{4}$ x 1 "	5.40	.55
$\frac{1}{2}$ x $1\frac{1}{2}$ "	8.00	.80
$\frac{3}{4}$ x $1\frac{1}{2}$ "	10.00	1.00
$\frac{1}{2}$ x $1\frac{1}{2}$ "	11.50	1.15

LATHE TOOLS.

No.	No.
1. L. H. Side.	7. Cutting-Off.
2. R. H. Side.	8. Threading.
3. R. H. Bent.	9. Bent Threading.
4. R. H. Di'm'd pt.	10. Roughing.
5. L. H. Di'm'd pt.	11. Boring.
6. Round Nose.	12. Inside Thread'g.

PLANER TOOLS.

No.	No.
1. Stocking.	7. R. H. Side.
2. Roughing.	8. L. H. Side.
3. R. H. Bevel.	9. Cutting-Off.
4. L. H. Bevel.	10. Smoothing.
5. R. H. Siding.	11. R. H. Di'm'd pt
6. L. H. Siding.	12. L. H. Di'm'd pt

See Knurling tools page 125.

IMPROVED LATHE AND
PLANER TOOLS.

Within the past few years, there has been brought out a great variety of improved tools suitable for Lathe and Planer work. The special advantages claimed for these tools consist in their great convenience and economy. One pound of tool steel in most of these tools takes the place of from five to ten pounds of the ordinary tool, the steel being practically all used up, and is not liable to loss from re-forging. After each forging the ordinary style of tool requires considerable grinding to reduce it to shape, whereas these tools are made to shape, thus saving these successive grindings.

SLATE'S PATENT CUTTING-OFF TOOL, FIG. 831.

The blades in this tool are 6 inches long and $\frac{1}{2}$ wide, milled and ground on both sides to give proper clearance. These blades require grinding on the end only. This tool is handy in Planer or Shaper, for splinting shafts and many other uses; the $\frac{1}{2}$ to $\frac{1}{4}$ blades make a cheap planing tool. The shank of holder entering tool-post is $\frac{1}{2} \times 1\frac{1}{4}$ inches. Price of Holder with one blade, \$2.25; extra blades, $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ inch thick, 30 cts.; $\frac{1}{2}$, 35 cts.; $\frac{3}{4}$, 40 cts.; $\frac{1}{2}$, 45 cts.; and $\frac{1}{4}$ inch, 50 cents.

OFF-SET HOLDER, FIG. 832.

This style of tool has been brought out lately; short blades from the straight holder can be used. Shank of holder is $\frac{1}{2} \times 1\frac{1}{4}$ inches. Price, with one blade, \$2.25.

JOHNSON CUTTING-OFF TOOL, FIG. 833.

Fig. 833 represents a Cutting-off Tool similar in general principles to the other,

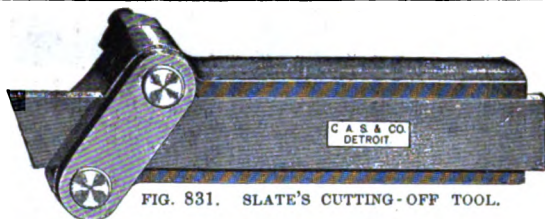


FIG. 831. SLATE'S CUTTING-OFF TOOL.



FIG. 832. SLATE'S OFF-SET CUTTING-OFF TOOL.



FIG. 833. JOHNSON'S CUTTING-OFF TOOL.

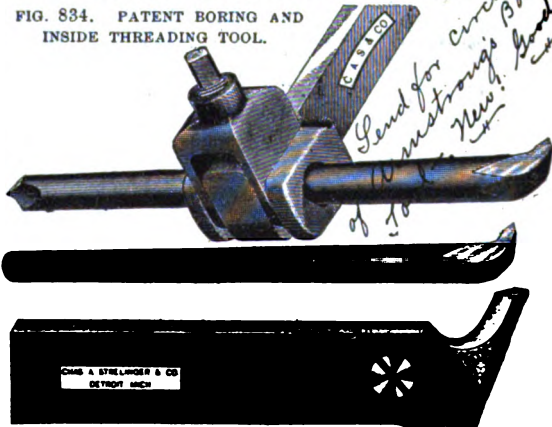
FIG. 834. PATENT BORING AND
INSIDE THREADING TOOL.

FIG. 835. SLATE'S DIAMOND POINT HOLDER.

but slightly different in shape; having no projection, it is especially adapted to Screw Machines, and the smaller sizes can be used for Foot Power lathes.

No.	Price.	Size.	Length.
00	\$2.50	$\frac{1}{4} \times \frac{1}{2}$	$4\frac{1}{2}$ inches.
0	2.50	$\frac{1}{4} \times 1$	5 "
1	2.50	$\frac{1}{2} \times 1\frac{1}{2}$	6 "
4	3.25	$\frac{3}{4} \times 1\frac{1}{2}$	$6\frac{1}{2}$ "

DIAMOND POINT HOLDER, FIG. 835.

Price of Holder and Diamond Point \$1.00. Extra points each, 25 cts. Shank of holder is $\frac{1}{4} \times 1\frac{1}{4}$.

BORING AND INSIDE THREADING TOOL, FIG. 834.

This tool is furnished with three cutters; the largest cutter is made with a drill point, to be used as a starter. It is an uncommonly useful tool. Price complete, \$2.30. Size of Shank, $\frac{1}{4} \times 1\frac{1}{4}$.

ARMSTRONG TOOL HOLDER, FIG. 836.

This holder is made in six sizes, holding Cutters $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{3}{8}$ inch square. The Cutters are made of "self-hardening" steel with points ground to shape.

No.	Price.	Size, in.
0	\$1.65	$\frac{1}{4} \times \frac{1}{4} \times 5$
1	1.80	$\frac{1}{4} \times 1 \times 6$
2	2.30	$\frac{1}{4} \times 1\frac{1}{4} \times 7$
3	3.00	$\frac{1}{4} \times 1\frac{1}{2} \times 8$
4	3.80	$\frac{1}{4} \times 1\frac{3}{4} \times 9$
5	4.75	$1 \times 1\frac{1}{4} \times 10$

These prices include three cutters; extra cutters are 15 cts., 22 cts., and 30 cts. each respectively.

WOODBIDGE LATHE AND PLANNER TOOL, FIG. 837.

The prices of tools include four cutters, one each R. H. and L. H. Diamond Point and Side Tool.

No.	Price.	Size, in.
0	\$2.50	$\frac{1}{4} \times \frac{1}{4} \times 4\frac{1}{2}$
1	3.00	$\frac{1}{4} \times 1 \times 6$
2	3.00	$\frac{1}{4} \times 1\frac{1}{4} \times 6$
3	4.00	$\frac{1}{4} \times 1\frac{1}{2} \times 8$

NEW THREADING TOOL, FIG. 838.

The cutters in this tool are simply ground on top, to sharpen. Besides the Threading Cutters priced here, we can furnish off-set cutters and various styles of forming tools to go in this holder. Price of Holders includes one cutter. No. 1, $\frac{1}{4} \times \frac{1}{4} \times 5\frac{1}{2}$, \$2.75; No. 2, $\frac{1}{4} \times 1 \times 6$, \$3.75;

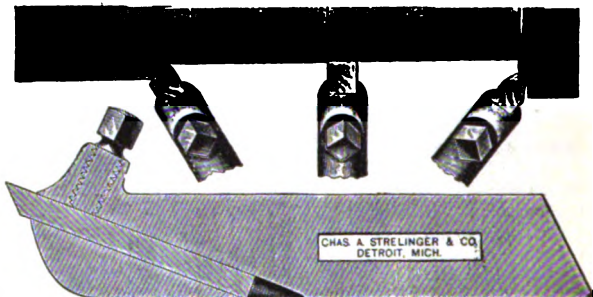


FIG. 836. ARMSTRONG'S LATHE TOOL.



FIG. 837. WOODBRIDGE LATHE AND PLANNER TOOL.

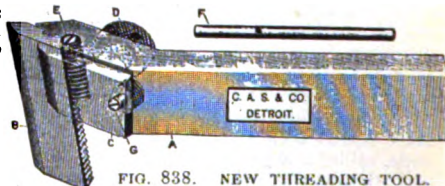


FIG. 838. NEW THREADING TOOL.



FIG. 839. RHODES SQUARE THREADING TOOL.

No. 3, $\frac{1}{4} \times 1\frac{1}{4} \times 8\frac{1}{2}$, \$5.00. Extra single point cutters 4 to 20 pitch, 40 cts. each; 3 to 3 $\frac{1}{2}$ pitch, 75 cts. each. Chasers, 4 to 5 $\frac{1}{2}$ pitch, \$1.20; 6 to 8 pitch, \$1.00; 9 to 20 pitch, 90 cents each.

SQUARE THREADING TOOL, FIG. 839.

This is a convenient tool for cutting square thread; either right or left hand threads can be cut. The cutters have clearance on side. Size of holder, $\frac{1}{4} \times 1\frac{1}{4} \times 5\frac{1}{2}$. Price of holder, with any one cutter, \$4.00. Single cutters for 3, 4, 5, 6, 7, 8, 9, 10, 12, 14 or 16 pitch, price, 50 cts. each. Special cutters furnished at special prices.

CENTERING MACHINES.

These machines are designed for centering and drilling stock preparatory to working it in a lathe. At one operation they center and drill round stock from $\frac{1}{4}$ inch to the full capacity of the various machines.

We can furnish to order any of these machines with four-jawed chucks, suitable for holding square stock.

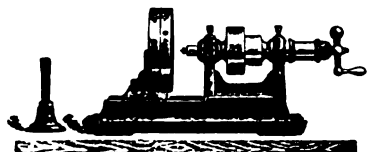


FIG. 840. CENTERING MACHINE.

No.	Capacity, inches.	Complete, Four-jawed with Chuck, Countershaft.	extra.	Iron Stand extra.
1	$\frac{1}{4}$ to 3	\$53.00	\$4.00	\$22.50
2	$\frac{1}{4}$ to 4 $\frac{1}{2}$	62.00	4.00	22.50
3	$\frac{1}{4}$ to 5 $\frac{1}{2}$	82.00	5.00	22.50
4	$\frac{1}{4}$ to 7 $\frac{1}{2}$	112.50		

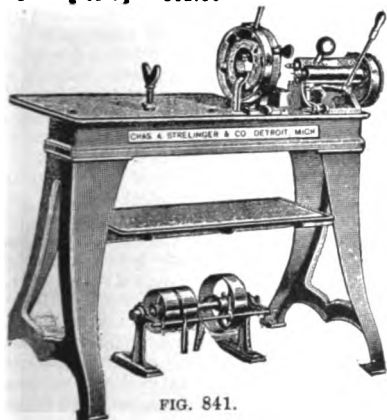


FIG. 841.

NEW TWO-SPINDLE CENTERING MACHINE.

With this machine two spindles are provided; one of which carries a drill, the other a reamer or countersink. They are driven at different speeds by a single belt, and are balanced by springs, as in Sensitive drill.

These Spindles are successively advanced to their respective cuts by a feeding lever. A complete description of this and other machines will be sent upon application. Price, complete, \$112.50.

EXTRACTS FROM CHORDAL'S LETTERS.

About fifteen years since, there began to appear in the columns of the *American Machinist* a series of articles entitled, "Extracts from Chordal's Letters." The writings were bright, snappy and chock-full of good things, as well as lots of common sense, and were thoroughly appreciated by thousands of readers.

A choice selection from this series of articles were afterwards gotten together and published by the American Machinist Publishing Co., in the form of a book of 320 pages; and we know of no book that a machinist, or manufacturer of machinery, would find more pleasant or profitable to read.

The publishers have kindly allowed us to use some of the matter, and our only regret is, that space does not permit us to use more.

MANDRELS.

***** If the owner of a genuine, simon-pure machine shop (and by that I mean not a systematized manufacturing establishment) wants his eyes opened, let him take a note-book into the shop and keep an account of the money spent in turning up mandrels for one month. There are some nice machinists in the country, who don't know what I am talking about when I refer to turning up mandrels, and if they would go into one of these common shops they would not recognize a mandrel if they saw it. In ninety-nine shops out of a hundred, each man fits his mandrels as he goes along. He keeps them lying on the floor under the foot of his lathe, always. All the mandrels in the shop are, of course, common property.

If Walker wants to turn up a job, he takes the piece with him and goes down among his lot of mandrels and tries to find one which will fit the hole he has bored. He don't find one big enough, so he goes to Dix's lathe, and don't find one that isn't too large. He makes the grand rounds, and then drops into the blacksmith shop, and picks out of the scrap pile a piece of two-inch round iron, maybe eight inches long, and maybe eighteen. He goes back in the shop and centers it, and starts as though he thought of drilling the centers, but he concludes he only wants to use the thing half an hour, so there's no use in drilling. Then he gets

it in the lathe, and when he gets one end squared up, he concludes that it is too much trouble to turn the thing around and square the other end, so he proceeds to make his fit. First a heavy cut, then a light one, then two more light ones, then he files it, and then he tries it, and then his chin goes up and his eyebrows come down, for his mandrel fits like a mouse's tail in a flour barrel, as he expresses it between oaths. Now, it luckily happens that he only turned up about three inches in length, so all he has to do is to turn another three inches and get a good fit, you know. He is bound to have it big enough this time.

Soon it is done, and he proceeds to drive it in. The thing he drives through is always an old gear brought in from the scrap-pile years ago. The hole in the aforesaid gear is so big that it would let his job right through, so he hunts up something smaller to lay on it. He finds it necessary to use two or three of these underlays, so as to reduce size properly. He has built up a cob house about two feet high, and, ten chances to one, one of the "cobs" is a nicely bored piece of finished work. No matter; he puts his job on top of the pile and sticks the mandrel in. Then he hunts up a nut always. He don't find any loose one, unless he takes the one he uses for a candlestick and keeps stored on the inside of his lathe. He finally takes one off one of his bolts, and carefully balances it on the craggy, rough end of his mandrel. Then he calls Dix to hold the mandrel. Dix does so, and Walker goes for the sledge and comes down on the thing three times. Too tight. He lets Dix go, and, turning the thing end for end, sets the nut on the mandrel, and comes down heavy to drive the mandrel out. Mind you, he is getting mad all this time, for he is having bad luck. He strikes a crooked lick and knocks the whole cob house down, and the hot-pressed nut splits, one-half just missing Lambert's ear on its way to the foundry, the other half goes out the front door into the street. He erects the structure again, and fishes out his candlestick. After knocking the greasy nut off two or three times, he gets his mandrel out and files it smaller. He is getting a little bit madder. Now he takes it out, takes the dog off, goes and hunts up the nut under a vise bench, and starts the mandrel. It

drops in clear up to the shoulder. He was too mad when he filed it last. He is entirely too much out of patience now to turn up a new place, so he goes to a vise, and, screwing his mandrel in it, proceeds to raise a burr all over it with a prick-punch.

In course of time Walker is looking for a mandrel about an inch and a half. He has his job with him, and is searching under Moore's lathe, finds this identical mandrel, and, as good luck will have it, there is a place on it which exactly fits his job. He is smart enough to put it in the lathe to see how much the small and limber end of it has got bent during late drivings. He finds that no part is true, and that no two parts are true with each other, which shows that it got a new bend each time it was used. The part he wants is almost true. He can see it wink, but thinks it will do—he uses it. Here are five botches at once; first, a mandrel which is not true; second, an inch and a half mandrel which must use a two-inch dog, and which is made very limber by having part of its length three-quarters of an inch in diameter; third, a mandrel without drilled centers, etc.; fourth, a mandrel with such a rough surface-fit that it must be driven with a sledge; fifth, a machinist who will play unnecessary parts in the business; and, sixth, a shop owner so reckless of money, as to pay each year for mandrel turning, an amount which would three times over buy a good set of hardened and ground steel arbors. Take your note book into the shops; if you have a good set of mandrels they will save big money and make your sizes uniform, because the boys will get into the habit of making a two-inch hole two inches. Such mandrels are ground after hardening, and the surface fit is such that a lead or copper hand hammer will drive a three-inch mandrel for twenty-four inch work. When Walker would need a mandrel he would know just what to get, and when he would go after a dog he would get the right one, instead of lugging his job all round the shop to find a mandrel, and then lugging the mandrel around to find a dog to fit the big end.

Don't dream of making nice mandrels. Go and buy them the same as you would buy wood screws, from some one fixed for making them. * * *

STEEL MANDRELS.

These Mandrels are slightly tapered; sizes correspond to the Morse Twist Drill Co.'s Standard Reamers, and will fit holes reamed by them. They are hardened and accurately ground to size.



FIG. 842.

Diam. in.	Price Each.	Length in.	Diam. in.	Price Each.	Length in.
$\frac{1}{8}$	\$.65	3 $\frac{1}{2}$	2 $\frac{1}{8}$	\$ 6.00	12
$\frac{1}{4}$	.75	4	2 $\frac{1}{4}$	6.50	12
$\frac{3}{8}$	.85	4 $\frac{1}{2}$	2 $\frac{3}{8}$	6.90	12
$\frac{1}{2}$	.95	4 $\frac{3}{4}$	2 $\frac{7}{8}$	7.40	12
$\frac{5}{8}$	1.05	5	2 $\frac{7}{8}$	7.90	12 $\frac{1}{2}$
$\frac{3}{4}$	1.15	5 $\frac{1}{2}$	2 $\frac{3}{4}$	8.40	12 $\frac{1}{2}$
$\frac{7}{8}$	1.25	5 $\frac{3}{4}$	2 $\frac{1}{2}$	8.90	12 $\frac{1}{2}$
1	1.35	5 $\frac{7}{8}$	2 $\frac{1}{2}$	9.40	12 $\frac{1}{2}$
1 $\frac{1}{8}$	1.45	6	2 $\frac{1}{2}$	9.90	13
1 $\frac{1}{4}$	1.55	6 $\frac{1}{2}$	2 $\frac{1}{2}$	10.50	13
1 $\frac{1}{2}$	1.70	6 $\frac{3}{4}$	2 $\frac{1}{2}$	11.00	13
1 $\frac{3}{4}$	1.85	6 $\frac{7}{8}$	2 $\frac{1}{2}$	11.50	13
2	2.00	7	2 $\frac{1}{2}$	12.00	13
2 $\frac{1}{8}$	2.10	7 $\frac{1}{2}$	3	12.50	13
2 $\frac{1}{4}$	2.20	7 $\frac{3}{4}$	3 $\frac{1}{8}$	13.00	14
2 $\frac{3}{8}$	2.30	7 $\frac{7}{8}$	3 $\frac{1}{4}$	13.40	14
2 $\frac{1}{2}$	2.45	8	3 $\frac{3}{8}$	13.80	14
2 $\frac{3}{4}$	2.60	8 $\frac{1}{2}$	3 $\frac{1}{2}$	14.10	14
3	2.75	8 $\frac{3}{4}$	3 $\frac{3}{4}$	14.40	15
3 $\frac{1}{8}$	2.90	8 $\frac{7}{8}$	3 $\frac{7}{8}$	14.70	15
3 $\frac{1}{4}$	3.10	9	3 $\frac{7}{8}$	15.00	15
3 $\frac{3}{8}$	3.30	9 $\frac{1}{2}$	3 $\frac{7}{8}$	15.30	15
3 $\frac{1}{2}$	3.50	9 $\frac{3}{4}$	3 $\frac{7}{8}$	15.60	16
3 $\frac{3}{4}$	3.70	9 $\frac{7}{8}$	3 $\frac{7}{8}$	15.90	16
4	3.90	10	3 $\frac{1}{2}$	16.20	16
4 $\frac{1}{8}$	4.10	10 $\frac{1}{2}$	3 $\frac{1}{2}$	16.50	16
4 $\frac{1}{4}$	4.35	10 $\frac{3}{4}$	3 $\frac{1}{2}$	16.80	17
4 $\frac{3}{8}$	4.60	10 $\frac{7}{8}$	3 $\frac{1}{2}$	17.20	17
4 $\frac{1}{2}$	4.80	11	3 $\frac{1}{2}$	17.60	17
4 $\frac{3}{4}$	5.15	11 $\frac{1}{2}$	4	18.00	17
5	5.60	11 $\frac{3}{4}$			



FIG. 843.

TAPER MANDRELS AND EXPANSION BUSHINGS.

These are made by the Brown & Sharpe Mfg. Co. The taper is $\frac{1}{8}$ inch to the foot, and each size Mandrel above No. 3 will take three sizes of bushings. We use them in our shops to very good advantage.

[15]

TAPER MANDRELS.

No.	Each.	Whole Length.	Diam. at Small end.
3	\$1.40	3 $\frac{1}{2}$	.3125
4	1.50	4 $\frac{1}{4}$	.35
5	1.65	4 $\frac{3}{4}$	.45
6	1.80	5 $\frac{1}{2}$	.50
7	2.00	5 $\frac{3}{4}$	.60
8	2.25	6 $\frac{1}{4}$	.75
9	2.60	7 $\frac{1}{4}$	.90
10	3.00	7 $\frac{3}{4}$	1.06
11	3.50	8 $\frac{1}{4}$	1.25
12	4.00	9	1.50
13	4.75	9 $\frac{3}{4}$	1.75

EXPANSION BUSHINGS.

Outside diam. of Bush'g, in.	Each.	Length, in.	For Mandr. Number.
$\frac{1}{8}$	\$.55	1 $\frac{1}{2}$	3
$\frac{1}{4}$	.55	1 $\frac{1}{2}$	4
$\frac{3}{8}$	.65	1 $\frac{1}{2}$	4
$\frac{1}{2}$	.65	1 $\frac{1}{2}$	4
$\frac{5}{8}$	.80	2 $\frac{1}{2}$	5
$\frac{3}{4}$	.80	2 $\frac{1}{2}$	5
1	.95	2 $\frac{1}{2}$	6
1 $\frac{1}{8}$	.95	2 $\frac{1}{2}$	6
1 $\frac{1}{4}$	1.15	2 $\frac{1}{2}$	7
1 $\frac{1}{2}$	1.15	3	7
1 $\frac{3}{4}$	1.15	3 $\frac{1}{2}$	7
2	1.40	3 $\frac{1}{2}$	8
2 $\frac{1}{8}$	1.40	3 $\frac{1}{2}$	8
2 $\frac{1}{4}$	1.40	3 $\frac{1}{2}$	8
2 $\frac{3}{8}$	1.70	3 $\frac{1}{2}$	9
2 $\frac{1}{2}$	1.70	3 $\frac{1}{2}$	9
2 $\frac{7}{8}$	1.70	3 $\frac{1}{2}$	9
3	2.00	4	10
3 $\frac{1}{8}$	2.00	4 $\frac{1}{2}$	10
3 $\frac{1}{4}$	2.00	4 $\frac{1}{2}$	10
3 $\frac{3}{8}$	2.40	4 $\frac{1}{2}$	11
3 $\frac{1}{2}$	2.40	4 $\frac{1}{2}$	11
3 $\frac{3}{4}$	2.40	4 $\frac{1}{2}$	11
4	2.80	4 $\frac{1}{2}$	12
4 $\frac{1}{8}$	2.80	4 $\frac{1}{2}$	12
4 $\frac{1}{4}$	2.80	4 $\frac{1}{2}$	12
4 $\frac{3}{8}$	3.20	5	13
4 $\frac{1}{2}$	3.20	5 $\frac{1}{2}$	13
4 $\frac{3}{4}$	3.20	5 $\frac{1}{2}$	13

TORN CATALOGUES—Every article in this catalogue is very plainly described, either by figure, number, regular number, or name; and we beg our customers not to cut or tear out pages, or parts of pages, as this mutilates the book, and when done to any extent, destroys it for reference.

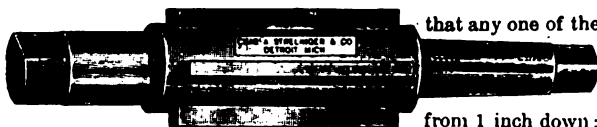


FIG. 844. NICHOLSON'S PATENT
EXPANDING LATHE MANDRELS.

The Arbors are made of best tool steel, carefully hardened and accurately ground; Sleeves are made of cold drawn steel tubing, and the jaws are made of steel closely fitted through four slots in the sleeve, hardened throughout, ground and finished to size in their working positions. The bottom faces of the jaws are ground to conform to the radius of the Arbors.

No.	Each.	Extension, inches.	Length Arbor, inches.	Length Bearing inches.
00	\$5.00	$\frac{1}{2}$ to $\frac{1}{2}$	6	1 $\frac{1}{2}$
0	6.00	$\frac{1}{2}$ " 1	6 $\frac{1}{2}$	2
1	9.00	1 " 1 $\frac{1}{2}$	7 $\frac{1}{2}$	2 $\frac{1}{2}$
2	10.50	1 $\frac{1}{2}$ " 1 $\frac{3}{4}$	9	3
3	14.50	1 $\frac{3}{4}$ " 2	11 $\frac{1}{2}$	3 $\frac{1}{2}$
4	20.00	2 " 2 $\frac{1}{2}$	14	5
5	32.00	2 $\frac{1}{2}$ " 3 $\frac{1}{4}$	14 $\frac{1}{2}$	5 $\frac{1}{2}$
6	39.00	3 $\frac{1}{4}$ " 4	16	6
7	40.00	4 " 4 $\frac{3}{4}$	18	6
8	41.25	4 $\frac{3}{4}$ " 5 $\frac{1}{4}$	19 $\frac{1}{2}$	6
9	43.75	5 $\frac{1}{4}$ " 7 $\frac{1}{4}$	20 $\frac{1}{2}$	6



FIG. 845. ARBOR DRIVING BLOCK.

This tool is intended for use in driving Arbors or Mandrels into and out of work. The Stand has finished steel top, and a strong die plate with suitable holes of various sizes is pivoted to a bracket, so

that any one of the holes may be swung over the center hole.

Small size, \$2.00, suitable for Arbors from 1 inch down; 7 holes in die-plate. Medium size, \$6.00, suitable for Arbors from 2 inches down; 6 holes in die plate. Large size, \$14.00, suitable for Arbors from 4 inches down; 6 holes in die plate.

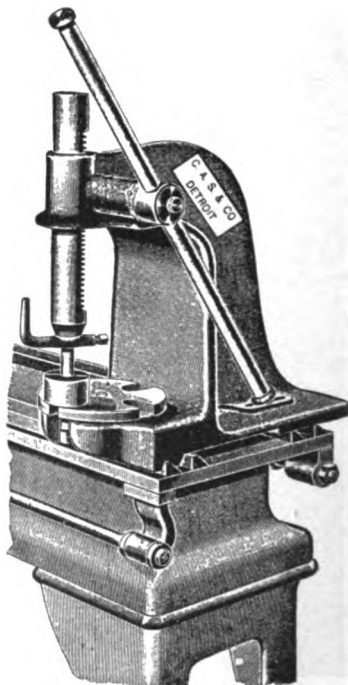


FIG. 846. GREENARD ARBOR PRESS.

This is a comparatively new invention, and has met with great favor. It has many points of excellence; it saves marring, upsetting or springing the arbors, cleaning out the centers and taking off the dogs, and defacing or otherwise damaging finished work.

No.	Price.	Largest diam of work.	Diam. Arbors.	Length Arbors.
1	\$12.00	6 in.	1 in	5 in.
2	13.00	6 "	1 "	7 "
3	16.00	12 "	1 $\frac{1}{2}$ "	9 "

SHAPING MACHINES.

The Shaper is one of the most popular and useful tools in a machine shop, and deservedly so. A great deal of work, especially of medium and small size, can be done to better advantage on a shaper than on a planer. It takes less room than a planer, which is often an important consideration, and the operator can put in and take out work, and handle the machine and the work much more rapidly than with the planer.

Shapers are made of three different types, viz: Crank, Rack or Geared, and Friction-Geared Shapers; there are not less than forty different styles made in these various forms.

The Crank Shaper is perhaps the best known, and hardly needs description.

The Geared Shaper has shifting belts, like a planer, which bring first the forward, then the back belt, on to a tight pulley.

The Friction-Geared Shaper is provided with a friction clutch, the motion being reversed by throwing the clutch into the forward or back pulley.

Each one of these types has its adherents, although we think there are more of the Crank Shapers sold than of either of the others.

While we have our own preferences in regard to shapers, we thought it might seem a little narrow to print only the style of shapers we liked best, unless our preference was indorsed by other manufacturers of large experience. With this idea in mind, we wrote to a number of first-class manufacturing concerns, asking them to advise us at to what style of shaper they considered the most desirable. We print here two of the replies received:

"Gentlemen:—Replying to yours of 20th inst. To best answer the purpose for which a Shaping Machine is designed, there is no question but that a Crank Shaper is the better form. All shapers were formerly made with crank motion, but of late people have come to use a Shaping Machine as a sort of small planer, and for this reason certain builders have felt a licence to make a Geared Shaper, which is always driven the same as planers are, but a shaper made in this way is always open to one very serious fault. A Shaping Machine, as its name implies, is made for planing, or removing metal from

irregular formed and shaped pieces of stock, which cannot be turned in a lathe or planed on a regular planer, and it was for this reason that angular and circular feeds were put onto shapers, and were always made with a crank motion, so the tool could be stopped at a given point, always, as it is set. A Geared Shaper, like a planer, can never be made to stop, or be shipped, at exactly the same point, for the reason that the shipping dogs reverse the belts and then the momentum of the table and the slipping of the belts are uncertain quantities which govern the shipping of the ram to a certain extent; but the crank motion is a positive one and it can go only so far as it is set to go, every time.

The shapers made by Wm. H. Warren Machine Tool Works, embodies the Shaping Machine in its best form, and the U. S. Government have lately given them orders for all their shapers, over all competitors, although Warren's prices are considerably higher than the others.*

The Fitchburg Machine Co. make a very good Crank Shaper; and we think the Putnam Machine Co. also, although we are not familiar with the Putnam.

We think Geo. D. Walcott & Son make the best designed Geared Shaper, and if their workmanship is first-class it is the best Geared Shaper in the market. There are about as many Geared Shapers sold as there are Crank Shapers, for the reason, as above stated, that people are coming to use a shaper more and more for plain work, on work that can be done to better advantage than on a small planer.

The Whitcomb Crank Planer, in our opinion, is the best in the market.

We have now given you, in a general way, our idea of the Shaping Machine, and for our own purposes we should never think of buying a Geared Shaper, or one that does not have crank motion, but as shapers are a little out of our line we are not familiar with all the different makes. Trusting this gives you the information, we remain,

Respectfully yours,"

"Gentlemen:—In answer to your favor of 20th, we hand you the following as our opinion on the Shaper question:

For short strokes the Crank Shaper has

*The Warren Shaper referred to is a very heavy, expensive tool. The 19 inch Machine weighing in the neighborhood of 13,000 lbs.

the advantage, as the Geared Shaper will not usually make a cut or stroke, less than $2\frac{1}{2}$ inches, nor will it plane as close up to a cross line at the end of its stroke, but it will plane into a slot cross-ways of the work $\frac{1}{4}$ inch wide. And to plane closer to a line is oftentimes of little importance.

There are many cases in die-making and tool work where a very short stroke is necessary; then a short stroke Crank Shaper is best, but if there is but little of such short work, the Geared Shaper, doing general work to much better advantage, is best.

To change the length and position of cut with Geared Shaper, it is simply necessary to move shifter stops to proper position on ram, which may be done in an instant and while machine is in motion.

With Crank Shaper, it is first necessary to change crank pin to proper position and clamp it, and then change connection on ram to position that will travel tool over part requiring planing, and clamp it. To do this requires more time than with the Geared Shaper. The power or strength of cut is uniform in all cases with Geared Shaper; with Crank Shaper it is variable and apt to be lacking for long strokes, and especially so at midway of stroke, while for short strokes there is usually an excess.

With the Geared Shaper the cut is uniform in speed for the full length of its stroke, or any part of it; whereas with Crank Shaper the speed of cut gradually increases from start to fastest at middle of any stroke, and as gradually decreases to end, the average of lap being not less than $\frac{1}{4}$ ". Another lap of $12\frac{1}{2}$ per cent or more is due to crank motion.

From what has been said, it will be plain that the crank is not best for shapers of long stroke, and that the best conditions are when the stroke is less than 12 inches, and then for good results the weight and strength should be equal to that of a 22 inch Geared Shaper.

Yours, etc."

In the limited number of inquiries we sent out, we did not happen to reach any one using the Friction-Geared Shaper, but there are many who use this type, and prefer them to either of the others. We know of but one concern who make this kind of shaper, the Heudey Machine Co.

B. & P. CRANK SHAPING MACHINES.

These machines have been on the market for a great many years. They have recently been improved and capacity increased. They will be found very complete in all their appointments; are made of good materials, and the workmanship is excellent.

The table is adjusted in the 6 and 8 inch sizes, by means of a screw and wheel; and in the 10 inch size by a crank at the side, and will take a stroke to their full capacity, and can be easily adjusted to any less distance required.

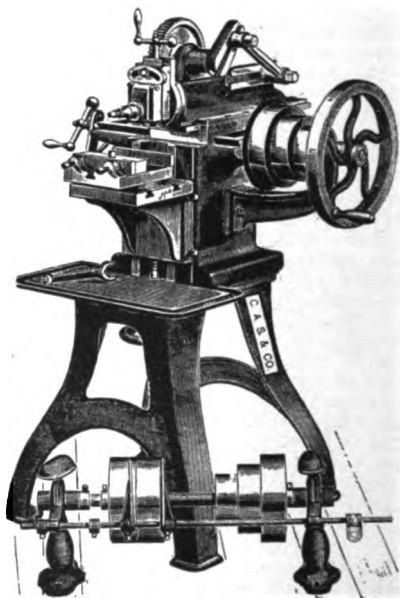


FIG. 847. 6 INCH B. & P. SHAPER.

These machines will do accurate work, and are desirable tools for Model makers, Die sinkers, Railroad, Repair and other shops where there is much short work to be done by filing or planing, thus saving the expense and room of a large planer, besides the large saving in files and labor required on such work.

Dimensions and prices on next page

DIMENSIONS AND PRICES OF 6 INCH B. & P. SHAPER, FIG. 847.

Length of stroke, 6 inches; length of traverse, 9 inches; greatest distance between tool and table, 8 inches; Swivel Chuck, 7 inches long, $4\frac{1}{2}$ inches between jaws, $1\frac{1}{2}$ inches deep; weight of machine, 450 lbs. Price, with Swivel Chuck, complete, as shown in cut, \$121.50; price, Hand Machine, without Cone and Countershaft, \$108.00; price, Hand Machine, on Bench, without Stand, etc., \$100.00; price of Plain Chuck, 9 inches long, extra, \$9.00.

We can furnish the above machine, with Countershaft and Swivel Chuck, with length of Traverse 14 inches, and including Plain Chuck, 14 inches long. Price, \$144.00.

DIMENSIONS AND PRICES OF 10 INCH SHAPER.

The 10 inch Machine, Fig. 849, being on a pedestal, admits the placing of long work in front of the machine, for which there is provided a face plate for attaching such work as legs of machines, etc.; to which also may be attached any angle plate, either in a right or left-hand position, and at an angle with the face plate. The Swivel Chuck may be fastened to either the face plate or angle plate.

Length of stroke, 10 inches; length of traverse, 15 inches; greatest distance between tool and table, 18 inches; distance under tool, after removing table, 36 inches; Swivel Chuck, 9 inches long, 6 inches between jaws, $1\frac{1}{2}$ inches deep; weight of machine, 1000 lbs.

Price, with Swivel Chuck, complete, \$225.00; price of Front Face Plate, extra, \$16.00; price of Angle Plate, extra, \$14.00; price of Plain Chuck, 15 inches long, extra, \$15.00.

We can furnish, when desired, nearly any make of Shaping Machine that is on the market, and will be pleased to correspond with any one in reference to this class of machines

DIMENSIONS AND PRICES OF 8 INCH SHAPER.

Length of stroke, 8 inches; length of traverse, 12 inches; greatest distance between tool and table, 10 inches; Swivel Chuck, 8 inches long, $5\frac{1}{2}$ inches between jaws, $1\frac{1}{2}$ inches deep; weight of machine, 750 lbs. Price, with Swivel Chuck, complete, \$180.00; price of Plain Chuck, 12 inches long, extra, \$12.00.

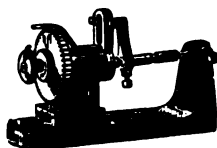


FIG. 848. SHAPER CENTERS.

The above cut represents a pair of Shaper Centers that will be found useful in fluting reamers, taps, etc.

Price, No. 1, \$12.00; between centers, 9 inches; diameter of swing, 6 inches.

Price, No. 2, \$18.00; between centers, 12 inches; diameter of swing, 10 inches.

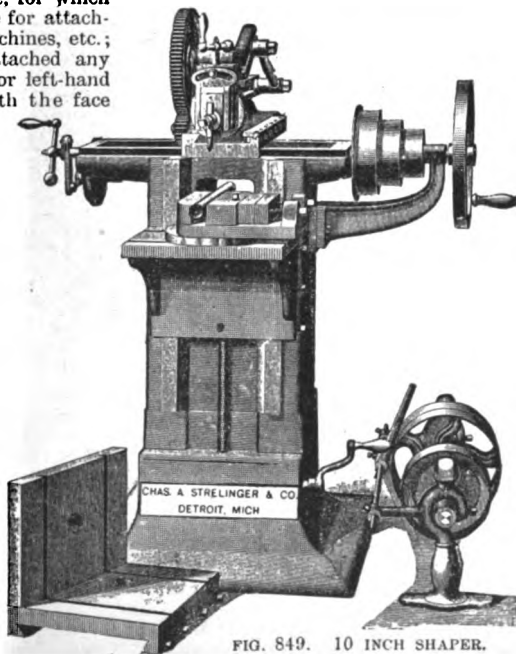


FIG. 849. 10 INCH SHAPER.

CRANK SHAPING MACHINES.

These machines are heavily geared, giving great power and high velocity. The tool-head is made to swivel, and graduated to plane all angles. The cross-rail raises and falls by means of a screw and bevel wheels. The gears are cut from solid stock; the screws, studs, and shafts are of steel. The sliding surfaces are all accurately fitted by scraping, and every machine is belted and tested before leaving the shop.

The Arch Column cast on each side of the frame, just back of the front, greatly strengthens the whole frame, including the large gear bearing, and resists the strain of the cross-rail.

Swivel-Vise furnished has a graduated plate; steel-faced jaws, opens to 8 in., is 2 inches deep and 10 inches wide; can be used on the top or side of table, and can be attached so that the jaws will project past either side of the table. Can be swiveled to any angle, and is securely held in position at right angles by a taper-wedge.

Box Table is furnished with each machine, work can be bolted on the top and both sides. Being made in this form, it has, in addition to the above advantages, a degree of stiffness not possessed by tables of other form. It can also be used as a receptacle for tools, etc. The table may be removed and work bolted to the slotted apron, to which the box is attached. This is an advantage when planing the tops and sides of heavy pieces, such as legs of machines, etc.

In the machine illustrated above, the Adjustable Crank-Pin is a novel feature. It consists of an internal gear, with the pin attached; this is secured to the large gear-wheel by a bonnet, and is operated from the outside of the frame by the hand-wheel, in connection with the shaft and pinion. This shaft is hollow, and con-

tains the lock. By holding the shaft still when the tool is in motion, the stroke can be changed to any length up to 15 inches, and back to nothing, as the crank-pin describes a perfect circle. The ram is adjustable by a screw, to suit the position of the work, and a short stroke can be had at either extreme, or any intermediate point.

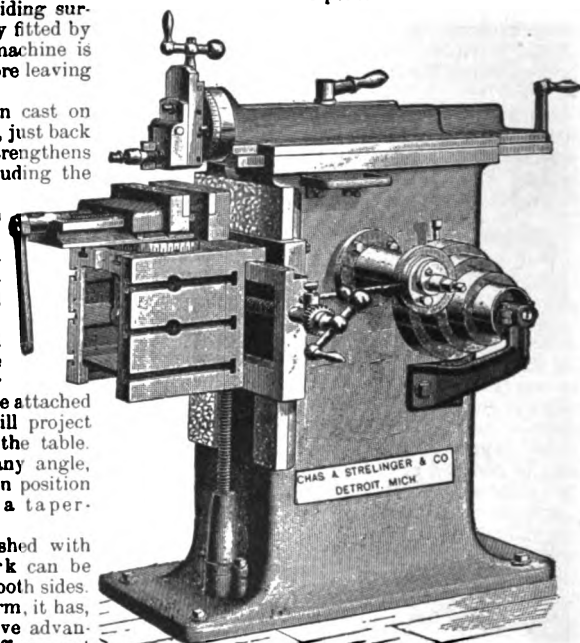


FIG. 850. CRANK SHAPING MACHINE.

DIMENSIONS, ETC.

Stroke,	15	90 in.
Bearing of ram in column,		
at full stroke,	22	25 "
Horiz. movement of Table,	20	23 "
Vertical " " "	16	16 "
Feed of Tool Block,	6	7 "
Opening of Vise,	8	10 "
Changes of speed with cone,	4	4 "
Pulleys on Counter,	12x3	12x3 "
Weight,	2,000	2,300 lbs

Complete with Vise, Countershaft and Wrenches. Prices given upon application.

WALCOTT SHAPERS.

These machines are built from entirely new and improved patterns, and are strong, well built tools, capable of doing the best work in the most expeditious manner. The stroke can be changed in-

stantly while the machine is in motion. Speed of tool is the same throughout the cut, with quick return, three to one. The tool head is graduated, and swivels to 50 degrees from perpendicular. Sliding surfaces are very ample and thoroughly fitted by scraping. They have opening through machine so that long shafts may be key-seated. Countershaft is arranged for two speeds, one for cast iron and one for steel. With each machine is furnished a graduated swivel chuck. The ram support over the table is a feature of especial value, and is furnished in this make of Shaper only.

The driving pulley on countershaft is 10x2½ inches. The cone pulleys 4½, 6½ and 8 inches in diameter by 2 inch face.

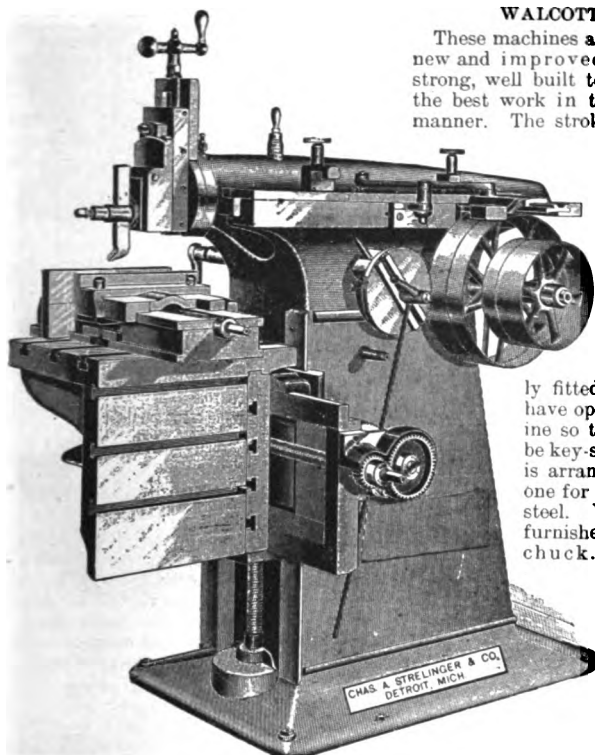


FIG. 851.

26 INCH WALCOTT GEARED SHAPER.

DIMENSIONS.

Length of Stroke,	15	22	26	30	34	48 inch.
Price with Chuck and Countershaft,	*	*	*	*	*	*
Distance from Tool to Top of Table,	16	18	18	18	18	18 "
Automatic Cross Feed,	15	22	26	30	34	40 "
Top of Table,	10x14	12x17	14x19	16x21	18x24	22x30 "
Face of Platen,	10x11	12x13	14x15	16x17	18x19	22x22 "
Ram Support over Table,	4	5	6½	7	8	16 "
Tight and Loose Pulleys,	7	8	6	10	12	14 "
Cutting Speed of Tool, Feet per min.,	30	25	22	22	20	20
Speed of Countershaft, Rev. per min.,	310	310	310	280	280	280
Weight of Machines, lbs.,	1,100	1,800	2,400	3,000	4,000	7,000
Extra for Power Down Feed,		\$20	\$20	inc'l'd	inc'l'd	inc'l'd
" - Circular Attachment,	\$25	30	35	\$40	\$45	\$75
" Key Seating " 30 in.,	25					
" " " 40 "		\$30	\$30			
" " " 60 "				\$40	\$40	\$40

*Prices on application.



FIG. 852. LEVELING, OR BENCH PLATES.

These plates are made of good iron, accurately planed on one side only.

Dimensions in inches. Wgt.				
No.	Each.	Width.	Lgth.	Thick. lbs.
1	\$3.75	14 x 18	x 1½	95
2	5.00	14 x 18	x 2	126
3	7.25	14 x 18	x 2½	158
4	5.00	14 x 24	x 1½	126
5	6.75	14 x 24	x 2	168
6	8.50	14 x 24	x 2½	210
7	8.65	18 x 24	x 2	216
8	10.75	18 x 24	x 2½	270
9	13.50	18 x 30	x 2½	338
10	16.25	18 x 30	x 3	405
11	18.75	24 x 30	x 2½	450
12	21.75	24 x 30	x 3	540

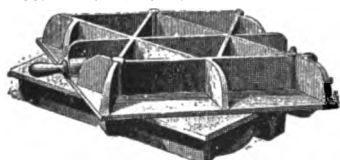


FIG. 853. B. & S. SURFACE PLATES.

For obtaining absolutely correct plane surfaces, the Surface Plate is indispensable. They are usually sold singly, not in pairs, as shown in Fig. 853. The following prices are for a single plate with a neat box and cover:

Size.	Each.	Wgt.	Size.	Each.	Wgt.
6 x 6	\$5.00	7	12 x 18	\$29.00	53
6 x 12	10.00	19	14 x 14	27.00	47
7 x 7½	7.00	11	14 x 18	33.00	62
7 x 10	10.00	15	16 x 16	36.00	63
8 x 12	13.00	21	18 x 18	43.00	65
9 x 14	17.00	27	18 x 24	58.00	128
10 x 15	22.00	35	18 x 36	88.00	228

Can supply a number of other sizes.

EVERY-DAY CENTERS.

These Centers, Fig. 854, swing 6 inches, and will take 16 inches between centers. The index plate has five circles, divided into 60, 56, 54, 52 and 48 holes. Index plate, spindle and dogging plate, are cast in one piece. The centers are hardened. Price, \$20.00.

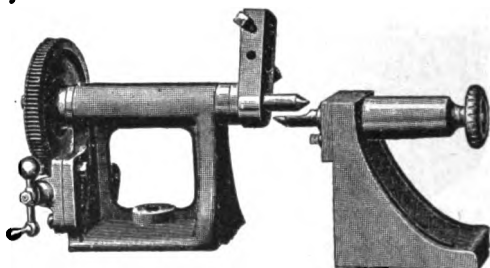
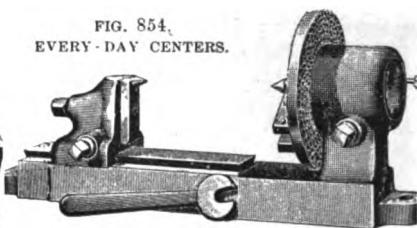
FIG. 854.
EVERY-DAY CENTERS.

FIG. 855. PLANER CENTERS.

These Planer Centers are especially well fitted and finished throughout. The worm, which revolves the spindle, is so arranged as to be moved out of gear when it is desired to use the Index alone. The dials have three rows of holes of such numbers as to admit a large range of work.

No. 1, \$40.00, 10 inch swing.

" 2, 44.00, 12 " "

" 3, 50.00, 16 " "

DRILL PRESS OR MILLING MACHINE VISE.

The Drill Press, or Milling Machine Vise, Fig. 856, can be bolted to any Drill Press or Milling Machine Table, and work

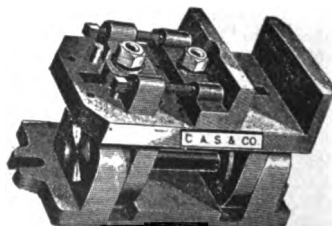


FIG. 856.

held perfectly secure in any position or angle by the two clamping screws.

Opening of jaw, 6 inches; length of jaw, 6 inches; depth of jaw, 2 inches; weight, 60 lbs.; price, \$18.00.

PLANER CHUCKS.

We present herewith a line of improved Planer Chucks, for Planers, Shapers, Milling Machines and Upright Drills.

These Chucks will hold straight or taper work, and can be moved instantly from least to greatest capacity, requiring no blocking or packing. The movable jaw will not tip back or raise work from the bed. There is a strip of tool steel on the back edge for set screws to go against. The round base chucks have a rib $1\frac{1}{4}$ inches wide, cast on bottom, to be fitted to slot on planer table. The 6 to 12 inch sizes have no T slots in the bed, the Movable Jaws being held down by steel gibs at end of jaws, running in grooves inside of bed, as shown in cut. All larger sizes have one T slot in center of bed to hold down the center of the jaw.

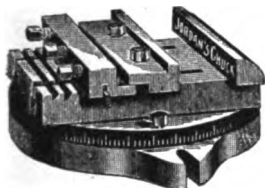


FIG. 857. ROUND BASE.

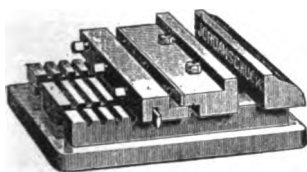


FIG. 858. SQUARE BASE.

Length of Jaw, inches.	Round Base	Square Base.	Depth of Jaw, inches.	Jaw Open, inches.	Greatest Diam. Outside, inches
6	\$21.00	\$17.00	1 $\frac{1}{4}$	3 $\frac{1}{4}$	12
8	25.00	21.00	1 $\frac{3}{4}$	5	14
10	30.00	25.00	2 $\frac{1}{4}$	6	15 $\frac{1}{2}$
12	34.00	29.00	2 $\frac{1}{2}$	7	17 $\frac{1}{4}$
15	40.00	36.00	2 $\frac{3}{4}$	9 $\frac{1}{4}$	21
18	48.00	44.00	2 $\frac{3}{4}$	11	24
24	72.00	60.00	2 $\frac{3}{4}$	16	29
30	96.00	80.00	2 $\frac{3}{4}$	21	34

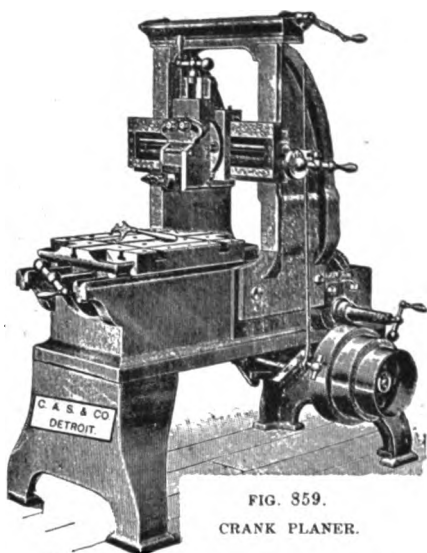


FIG. 859.

CRANK PLANNER.

This Planer is a tool very popular with machinists and others who have much short planing to do, as it has an advantage of at least one-third over the common planer in its capacity for turning off work.

It is built from recent patterns and contains many improvements, which make it a very superior and economical tool.

It has a stroke of 12 inches with a variable attachment to the connecting-rod to the table, so that the whole length of the table, 25 inches, can be planed.

It has a quick return motion, giving to the cutting stroke a movement nearly uniform, and is so constructed that the traverse of the table can be at will and with ease shortened or lengthened while the machine is in operation.

It has large Steel Shafting, long Bearings, Cut Gears, Patent Track Lubricators, Planed Slots with drilled and reamed holes in table, Patent Cross-head Fastening, Self-acting Horizontal, Vertical and Angular Feeds, Scraped Cross-head Fits and Offset Uprights.

It planes between uprights, 16 inches wide and 16 inches high; weight, about 2000 lbs. Countershaft and Wrenches with each machine. Price upon application.

SMALL PLANER.

In the past, small planers designed for the use of model makers, experimenters and amateurs, have had single lifting screws to raise or lower the cross head, and have been of so light design as to be of little practical use. The makers of the Hand and Power planers shown on this page, have made a wide departure from old designs and have produced a small planer, from heavy and well-proportioned patterns, mounted on a heavy cabinet bench with shelf brackets inside and out; making altogether a very complete and substantial machine tool.

This Machine can often be used in the manufacturing shop, and is almost a necessity, and has a well defined place in the model-maker's, experimenter's, gunsmith's and amateur's shop.

It can be used daily, until worn out by long service, and is capable of planing a heavy chip without chatter, or it can be used for the most delicate planing or shaping. The prominent features of the planer are the Double Lifting Screws and the simple manner of changing from Power to the Hand Crank, which is done by sliding the steel pinions on shafts out of gear. By so doing, the labor of running the planer by hand is reduced to the minimum, as the gear on crank-shaft now connects only with the rack on platen.

PLANER CHUCK.

The Round Graduated-Base Planer Chuck sold with this planer is 10 inches in diameter, weighs 40 lbs., and will hold any work placed between its jaws perfectly rigid. The movable parts are arranged to prevent chips or dirt clogging them, and they are guaranteed to be made in a first-class manner.

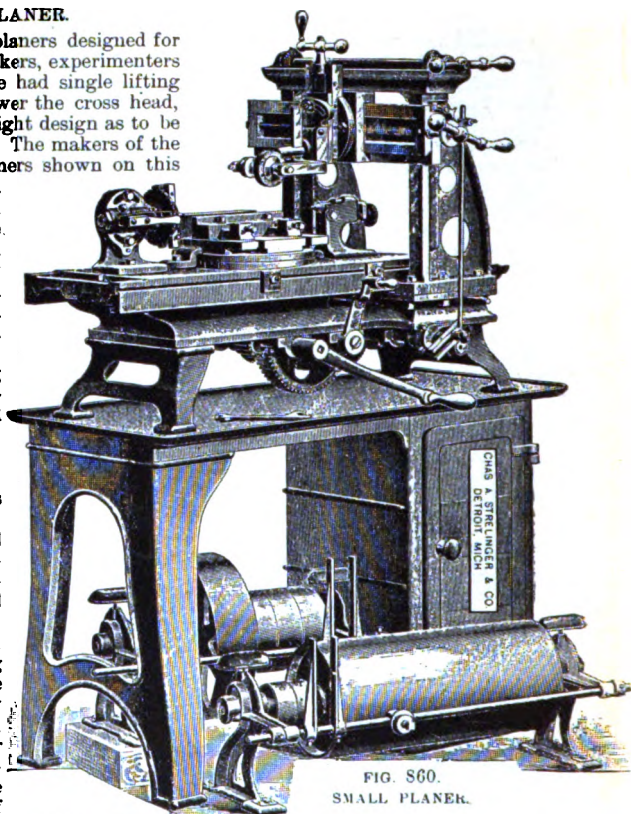


FIG. S60.
SMALL PLANER.

PLANER CENTERS.

A good pair of accurate Planer Centers are very desirable for holding tap, reamer and gear blanks, and for taper work of every variety. These Centers are 7 inch swing, and adjustable to do straight or taper work, and, although not highly finished, they are well made, and sold at a low price.

DIMENSIONS AND PRICES.

Planer complete with Countershaft and Wrenches (Net weight, 375 lbs.),	\$150.00
Planer Bench (weight, 225 lbs.),	16.00
Planer Chuck,	20.00
Planer Centers,	15.00
Grinding Attachment,	10.00

This Machine planes 30 inches in length, 12½ inches wide, and 8½ inches high.

WHITCOMB PLANERS.

These Planers have been continuously manufactured for the past 45 years, and have attained a world-wide, and, we think, deserved reputation for reliability and general excellence. Active and unceasing efforts on the part of the manufacturers have always kept these tools fully abreast of the times and in the front rank of machine tools. Wherever used they are, almost without exception, the favorite planer with the men in the shop and consequently are very profitable tools for the owner.

In their construction a high standard of workmanship is always maintained. Every machine is run and carefully tested before leaving the factory. Their design is such as to give the best disposition of material to produce rigidity and strength. Labor is expended just where it should be, we think, to give the greatest accuracy in working, and the best wearing qualities. In short, it has been and is the aim of the manufacturers to make tools which shall be first-class in every respect, and which shall be thoroughly economical and profitable planers to the users.

SPECIAL FEATURE.

There is a special feature embodied in the construction of the 17, 24, 30, 36 and 42 inch planers. By means of the offsets in uprights, as shown in illustrations, the capacity of the planer is increased as follows:

In the 17 inch, 2 inches in width for about 5 inches above the table.

In the 24 and 30 inch, 3 inches in width for about 6 inches above the table.

In the 36 and 42 inch, 4 inches in width for about 7 inches above the table.

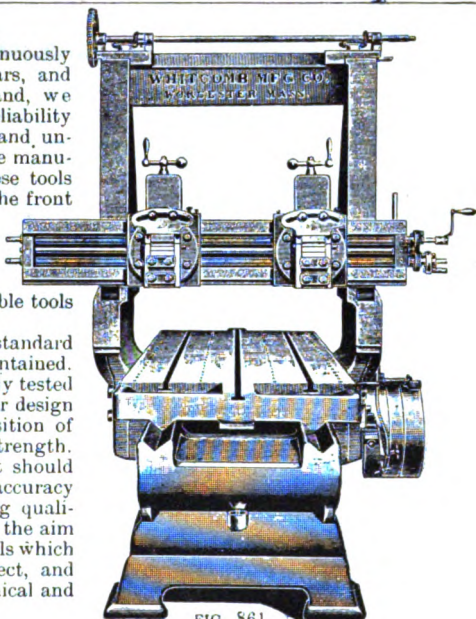


FIG. S61.

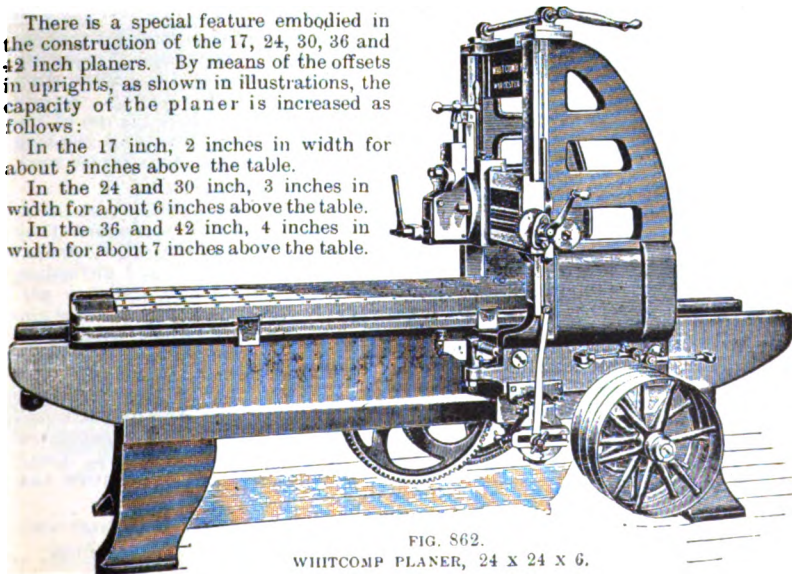
42 X 42 X 10 WITH DOUBLE HEAD.

FIG. S62.

WHITCOMB PLANER, 24 X 24 X 6.

Planer, Length, feet.	Planer, Width, inches.	Planer, Height, inches.	Weight, lbs.	Price, *\$
3	17	17	2500	
4	17	17	2800	
4	22	22	3650	
5	22	22	4000	
6	22	22	4400	
5	24	24	5400	
6	24	24	5800	
7	24	24	6300	
8	24	24	6800	
10	24	24	7900	
6	27	27	6400	
7	27	27	6900	
8	27	27	7400	
10	27	27	8400	
6	30	30	7000	
7	30	30	7500	
8	30	30	8000	
10	30	30	9200	
12	30	30	10400	
6	36	36	11000	
8	36	36	12500	
10	36	36	14000	
12	36	36	15500	
14	36	36	17500	
8	42	42	14000	
10	42	42	15500	
12	42	42	17000	
14	42	42	19000	

These Planers are built from recent patterns and contain many improvements.

They are very heavy and well proportioned, powerfully geared and capable of doing heavy and light work with great accuracy. They have large steel shafting, extra long bearings with cap boxes, and all gears and racks accurately cut from solid blanks; Patent Track Lubricators, a simple and exceedingly valuable device which keeps tracks perfectly oiled; Slots in table planed from the solid; Holes in table drilled and reamed; Quick Return; Patent Friction Feed, entirely disconnected from the shipper; Patent Cross-head Fastening, a powerful clamp device operated by one motion of a conveniently situated lever, thoroughly effectual and durable; best Self-Acting Horizontal, Vertical and Angular Feeds. Cross-head fits all carefully scraped.

* Prices upon application.

The Tool Block may be raised and lowered by means of the crank handle at the end of cross-bar (excepting in the 17 inch size).

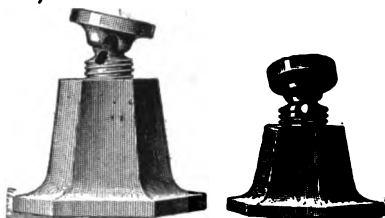


FIG. 863. PLANER LEVELING JACKS.

These Jacks are made in three sizes:

No.	Per dozen.	Each.	Height, inches.	Extends to inches.
1	\$10.00	\$1.00	2½	3½
2	12.50	1.25	3½	5
3	15.00	1.50	5	7½

To do true work on the Planer, or on any machine tool, it is indispensable that the work has a solid bearing on the table. This is a difficult matter if the casting is twisted, or if from its shape some points are left without support; hence comes the use of pieces of sheet iron, tin, wedges, blocks and the rest of the scrap heap. The drawbacks to this practice are well known. Time is lost hunting for packing pieces of just the thickness. Frequently the packing pieces yield under the strap pressure, springing the casting. Every mechanic will admit that the use of the usual rubbish for packing and blocking wastes time and leads to inaccurate work and winding surfaces.

After careful trial, we offer these Leveling Jacks as a great improvement. They are adjustable to any desired refinement; they are perfectly solid and unyielding under the strap pressure, and they permit one to raise or lower a point of the work as desired. It has a broad base, carefully faired. The steel screw has a square thread, with malleable iron cap, which is free to move on a ball joint, adjusting itself to angular or irregular surfaces and allowing the movement of the screw without jarring the work. Long steel rods are furnished to turn the screws.

If these are once given a thorough trial, the junkman will get the old packing.

GEAR CUTTING MACHINERY.

There are quite a number of Gear Cutting Machine Makers, among them the Brown & Sharpe Mfg. Co.; Brainard Machine Co.; Gould & Eberhardt; Garvin Machine Co.; Putnam Machine Works; Whiton Machine Co.. and the Dwight Slate Machine Co.

We have a number of Gear Cutters in constant operation, and are fitted up to cut gears, both Spur and Bevel, any size up to 60 inches in diameter, and up to 8 inches face. We feel, therefore, as though we were in a position to know something about Gear Cutting Machines.

We illustrate here two or three styles of Machines, and will be pleased to send complete description of these, or other machines, and also to furnish any information in our power.

We will be assisted in giving the desired information if our customers will kindly advise us as fully as possible what their requirements are.

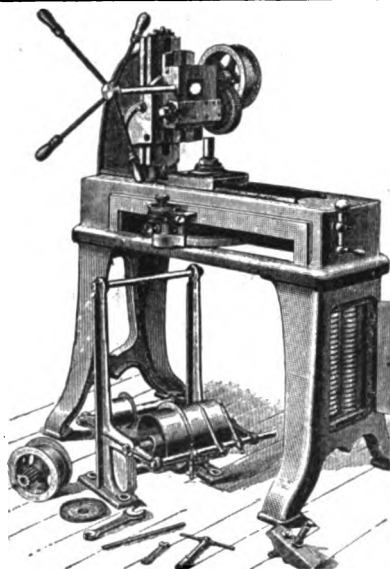


FIG. 866.

WHITON GEAR CUTTING MACHINE.

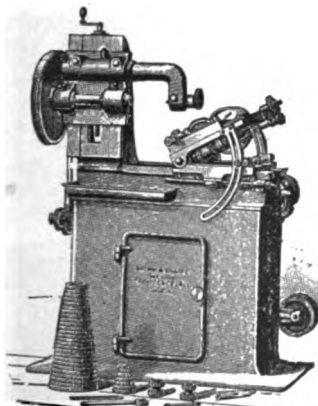


FIG. 864. BROWN & SHARPE AUTOMATIC GEAR CUTTING MACHINE.

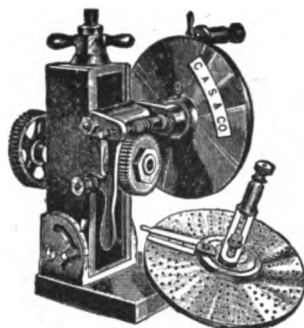


FIG. 867. GEAR CUTTING ATTACHMENT.

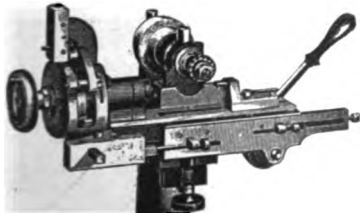


FIG. 865.

SEMI-AUTOMATIC PINION OR GEAR CUTTER.

This Attachment can be used on any Screw Cutting Lathe, for cutting small spur, miter or bevel gears. The blank to be cut is held on a mandrel fitting a taper socket in a spindle of the sliding head, and is revolved by a steel worm working in a gear connecting the dials. Two dial plates are furnished, giving 133 changes and dividing all numbers to 50, and all even numbers to 100, together with a great variety of other divisions. Price, complete as above, \$28.50.

MILLING MACHINES.

There have been great advances made in Milling processes, which have resulted in a great many improvements in Milling Machines during the past few years.

To do the subject of milling machines anything like justice, would require our taking—at least—from thirty to forty pages in this book, and we haven't the room to spare. The fact is—if we may be pardoned the conceit—we know too much about Milling Machines to undertake to go into any exhaustive description in the limited space we have.

We have in our own works, in constant use, seven different styles of Milling Machines, from one to three of each kind, and doing a great variety of work. In some cases, on certain classes of work, we are doing from six to eight times as much work as could be done on the Planer in the same time.

The most commonly used style of milling machine is what is known as the Plain Milling Machine. There are so many makes and styles of these machines, that we have thought best to refrain from showing any. If our customers will let us know what class of work they require a machine to do, we will be pleased to send illustrations and descriptions of different styles of machines, and furnish any information in our power.

MILLING LATHE.

Fig. 869 is a strong 16 inch Speed Lathe, having a Milling Table mounted on carriage, which can be moved to any position along the bed, by means of a hand wheel. Table can be raised by elevating screw clamped firmly in position. It is 6 inches wide, 24 inches long; has two T slots for securing fixtures, and has a feed motion of 14 inches. The surface is 5 inches below lathe centers when down, and can be raised 5 inches.

Spindle has $\frac{1}{2}$ inch hole, countershaft has pulleys for two belts giving spindle motion in either direction. Price, complete, \$135.00.

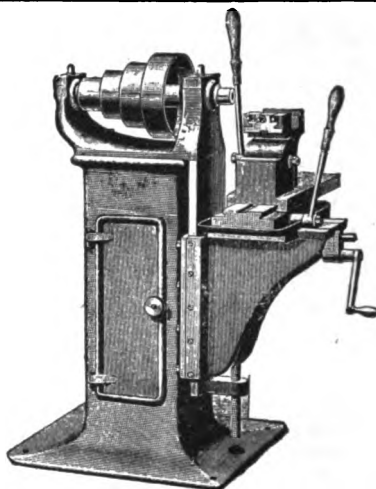


FIG. 868. HAND MILLING MACHINE.

The Hand Milling Machine is a most desirable tool for light work, such as is used in the construction of Sewing Machines, Bicycles, Typewriters, etc., etc.

We think the best machine of this type on the market at present, is the one made by the Pratt & Whitney Co. The cut shows the No. 2 machine. There are four sizes made. Dimensions and prices we will furnish upon application.



FIG. 869. MILLING LATHE.

Cutters are carried on arbors or shanks entering the spindle.

Can furnish a Slide Rest, with tool movement of 10 inches, suitable for above lathe, price, \$20.00.

Can also furnish a Vise, opening 3 inches; jaws 5 inches long and 1 inch deep. Price, \$12.

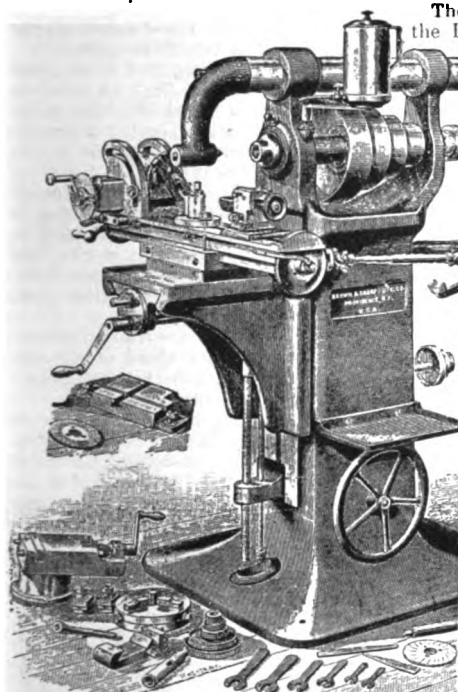


FIG 870 B. & S. UNIVERSAL MILLING MACHINE

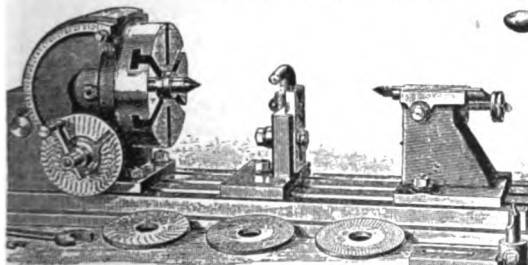


FIG. 871 INDEX HEAD AND CENTERS WITH CENTER REST

These Centers swing 12½ inches in diameter. The head can be set at any angle from 10 degrees below the horizontal to 10 degrees beyond the perpendicular. The Index Plates divide all numbers to 100, all even numbers to 134, and all numbers divisible by 4 to 200. Table is 32 inches long and 8 inches wide. Weight about 350 lbs. Prices upon application.

The Universal has all the movements of the Plain Milling Machine, and, in addition, the table is fed automatically at an angle to the axle of the spindle, and the spiral head is so made and connected with the feed screw, that a positive rotary movement may be given to the work.

The Brown & Sharpe Mfg. Co. were the originators of the Universal Milling Machine. Their production in this line has always been considered superior, and within the past year they have again strengthened and improved their line, besides adding one or two new sizes.

The cut, Fig. 870, shows a No. 1 Universal Milling Machine, with over-hanging arm. Price, as shown in cut, \$450.00; without arm, \$440.00.

This machine sold originally for \$1,000.00, and at as recent a date as 1891, sold for \$585.00.

The B. & S. Co. also make three larger sizes of Universal Milling Machines, of which we will send description and prices upon application.

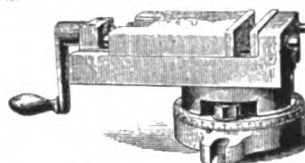


FIG 872. SWIVEL VISE.

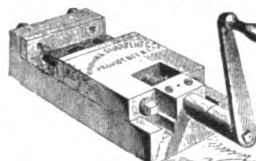


FIG 873. PLAIN VISE.

These vises are for use on Milling or Planing Machines. The Swivel Vise is especially convenient for angular milling or planing. Base is graduated so that the vise may be set at any angle.

No.	Plain.	Swivel.	With Jaw.	Depth Jaw.	Open.
1	\$12.00		3½	1½	1½
2	13.00	\$18.00	5½	1½	2½
3	18.00	23.00	6½	1¾	3½

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AND
EMERY GRINDING MACHINERY.

There is a lamentable amount of ignorance displayed by a great many users of Emery Wheels. We positively assert that there is no tool used in a shop that pays so large a per cent of profit on investment as a well managed emery wheel. We print the following suggestions from the Detroit Emery Wheel Co's catalogue, and earnestly ask that they be carefully read and remembered:



FIG. 874.



FIG. 875.

"Although solid wheels have been in use for many years, and to-day are considered an absolute necessity as a tool in nearly all metal-working shops, still we think that quite a proportion of the mechanics using them are not as well informed in their use as they should be, and feeling that the interests of the manufacturer and consumer are mutual, and that what benefits one must benefit the other, we trust the suggestions we offer will be kindly received.

No one emery wheel can be made that will be just right for working all the different kinds of metal, so where more than one kind is to be worked with the same wheel the proportion of each should be stated in sending orders for wheels.

The speed of emery wheels is a subject of so much importance, that it should receive the consideration of all who use them.

As a rule, the durability of an emery wheel is in proportion to its speed; or, in other words, a wheel that would give en-

tire satisfaction at its proper speed would be quite certain not to give satisfaction if run at one-half or two-thirds speed.

Where all that is required is to grind away the most metal in the least time, we advise the regular speed of about 5,500 feet per minute; or the number of revolutions for each diameter as given in the accompanying price list.

The grinding of tools for either iron or wood-working is of such a nature that it can only be well done with a wheel that is made especially for that work; but with such wheels the most delicate tools can be shaped and sharpened better than in any other way.

Every shop should have a speed indicator, in order that the speed of its machinery could be known, especially its emery wheels.

In no case should wheels be run at a greater number of revolutions than the manufacturer of them advises. Probably very few of the mechanics of the age think, or perhaps, know, of the great increase of centrifugal strain that is given a wheel in proportion to an increase of the velocity.

No sane manufacturer would, for an instant, think of subjecting his steam boiler to a pressure two or three times as great as the maker of it advises; and still emery wheels are run at a speed that increases the centrifugal strain upon them a number of times.

In this connection we feel it a duty to quote the following from a standard author upon this point:

"The centrifugal force of a body moving with different velocities in the same circle is proportional to the square of the velocity. Thus the centrifugal force of a body making ten revolutions a minute is four times as great as the centrifugal force of the same body making five revolutions in a minute. Hence in equal circles the forces are inversely as the squares of the times of revolution."

The last thing done before our wheels are boxed is to test them at twice the number of revolutions they should be run at. This, as will be seen by reference to the preceding paragraph, insures their soundness when they leave our hands.

Grinding machines of all kinds should be set upon a solid floor, and where it is

practical we advise, for large machines especially, a foundation of masonry.

A strong and substantial rest should be used where the nature of the work will admit of it. In the matter of rests much care should be used in keeping them properly adjusted in relation to the wheel. As a rule, the rest should be kept close to the wheel. It is not an uncommon thing to find a workman at a wheel with the rest so far from it, and the work of such a nature that should it be drawn from his hands it would certainly be drawn between the wheel and rest. This, we believe, is a very common cause for the breaking of emery wheels, and many a workman has paid the penalty with his own life for his carelessness in this respect alone.

Wheels should always be kept true with some tool suitable for the purpose. For this work we consider the Black Diamond or Carbon the best. The Huntington Dresser, however, is a good tool and, if properly used, will more than pay for itself in all shops where emery wheels are used. In a word, an emery wheel should be taken as good care of in its own way as should an engine, planer or lathe."

"AS TO CORUNDUM—We are and always have been the largest users of it of any manufacturer in the world. So far, the production of Corundum in any great quantity, is confined to the Hampden Emery Co., of Chester, Mass. Traces of it have been found in many places in the United States, but so far, this company is the only one that has been fortunate enough to find it in large quantities. Their mines are among the Blue Ridge Mountains of North Carolina, many miles from the railroads, where, with the rough and mountainous roads, a few hundred pounds make a load for an ordinary team to haul.

The crude ore is freighted to Massachusetts, and there crushed and graded and sold the same as emery, except at about three times the price of the latter.

Many of our wheels are made entirely of Corundum. We use it exclusively in all our wheels for saw and tool grinding, and in fact largely for all kinds of steel work. Wheels for working cast iron are, as a rule, better when made of emery; especially for heavy, rough work, such as agricultural implements, stoves and foundry work.

[16]

Many erroneously suppose that because Corundum has sharper cutting qualities than emery, it is necessarily harder. Such is not the case, for emery is much harder to crush than corundum; consequently an emery wheel, made with the same amount of bond or cement, would have the greater durability.

In a word; the only difference between emery and corundum is, that the crystals of the latter are, in the emery chemically combined with oxide of iron, which makes them harder to crush, but less sharp in abrasive qualities.

It is our constant effort to use such material as will make the best possible wheel for the work to be done. We have a record of the compound and manufacture of all the wheels made by us since the commencement of our business, and, consequently, can either duplicate the same or change the compound of any wheel, as the experience of our customers may dictate.

We are never so well pleased as when our customers are best pleased.

IN BRIEF—When you order wheels, tell just what the work is you want them to do.

Give us the number of revolutions your wheels make per minute.

Tell us whether your preference is for a hard, medium or soft wheel.

If you are a new customer, be kind enough to tell what make of wheels has met your wants the best.

If wheels fail to suit you, inform us in what particular they fail.

If you know, give the grade or number of emery you want your wheels made of.

AS TO USE—Set your machine on a solid foundation.

Keep in good order in all respects.

Keep your wheels true.

Never run them at a higher speed than the maker recommends.

Don't try to grind wrought iron with a wheel that was made for cast iron.

Keep wheels clean from oil and grease.

If wheel is soft, don't crowd the work too hard, as it will not grind any faster, but will wear the wheel out more.

See that your machine has tight and loose collar of good size, and that both are concave and fitted with rubber gaskets between collar and wheel."



FIG. 876. HART'S EMERY WHEEL.

The Hart Emery Wheel, made by the Detroit Emery Wheel Co., is conceded to be the best emery wheel in the market.

There are more of these wheels sold—and used—than of any other make, and this, notwithstanding the prices on these wheels are somewhat higher than others.

By the use of a wire web, emery wheels are made much stronger, and, consequently, will resist much greater centrifugal strain.

We can furnish to order, Cup wheels, Cylinder wheels, and in fact special wheels of almost any size and shape, and will be pleased to correspond with those desiring any information regarding Emery and Corundum Wheels.

In connection with the foregoing, we beg to suggest that users of Emery Wheels will find the article on page 244 both interesting and profitable.

Thickness in inches.

Diam.	Rev. per Min.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3
1		\$0.20	\$0.25	\$0.25						
1 $\frac{1}{2}$		.25	.30	.30	\$0.35	\$0.40				
2	8000	.25	.35	.35	.40	.45	\$0.50	\$0.55	\$0.60	
2 $\frac{1}{2}$	7800	.30	.35	.40	.45	.50	.55	.65	.70	
3	7400	.30	.38	.45	.51	.57	.66	.75	.81	
4	5450	.48	.57	.66	.74	.81	.96	1.14	1.32	
5	4400	.60	.72	.84	.96	1.08	1.26	1.56	1.80	
6	3600	.70	.79	.88	1.07	1.25	1.53	1.85	2.15	\$2.50 \$2.80
8	2750	1.06	1.18	1.30	1.55	1.80	2.25	2.85	3.20	3.80 4.15
10	2200	1.35	1.52	1.67	1.98	2.30	2.97	3.65	3.80	4.40 4.96 \$6.14 \$7.26
12	1850	1.58	1.70	1.80	2.25	2.70	3.33	4.05	4.28	5.10 5.62 6.96 8.30
14	1600			2.79	3.36	3.92	4.28	5.30	6.08	7.12 7.60 9.68 10.70
16	1400					4.95	5.48	6.76	7.76	8.80 10.00 12.32 14.60
18	1250					6.20	6.80	8.70	9.80	11.50 12.80 15.80 18.80
20	1100						8.00	10.00	11.60	13.60 15.20 18.80 22.40
22	1000							11.95	14.20	16.45 17.90 23.20 27.70
24	925								17.20	20.00 22.80 28.40 34.00
30	735									35.00 43.60 52.40
36	550									50.80 62.80 75.20

Always state purpose for which wheels are to be used.

CELLULOID EMERY WHEELS.

Celluloid and Rubber Emery Wheels can be used to advantage in cases where a thin wheel of large diameter is required. We print below a list of sizes that we usually carry in stock:

Diam. in.	Thickness in inches.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
2	\$0.30				
3	.55	\$0.55			
4	.75	.75	\$0.75		
5	.95	.95	.95	\$0.95	
6		1.15	1.15	1.15	\$1.15
8		1.75	1.75	1.75	1.75
10		2.50	2.50	2.50	2.50
12			3.70	3.70	3.70
16			5.40	5.40	5.40



FIG. 877.

HUNTINGTON EMERY WHEEL DRESSER.

In the past few years there have been placed upon the market Emery Wheel Dressers in almost endless variety. We have had samples of nearly every new Dresser that has been brought out, but we are inclined to believe that the old Huntington Dresser is the best.

We use in our own shops, perhaps more

Dressers and Wheels than are used in any other one shop in the world, besides selling thousands of them.

Dresser complete, with two sets of Cutters, \$2.00. Extra Cutters 30 cts. per set; postage, 3 cts.



FIG. 878. HAND DIAMOND TOOL.



FIG. 878a. LATHE DIAMOND TOOL.

The Diamond or Carbon Tools are used for turning, shaping and truing Emery and Corundum wheels. In our judgment, they are not as good for Dressing wheels as the Huntington Dresser as they do not leave the wheel in quite as good a condition for cutting. We mount them in steel holders as shown above, costing from \$4 to \$50, or even more, according to the size of diamond. The small size ones serve for small wheels. A size suitable for general work sells from \$12 to \$20.

We seldom get a poor Diamond, but in buying them we have to take our chances; and in selling, we do not warrant them in any particular.



FIG. 879. HURD RESPIRATOR.

For protecting the throat and lungs from dust, poisonous gases and all other impurities. The air is inhaled through a thin, wet sponge, or cotton, and passes out through the automatic valve in the side. Price, each, \$2.00.

GOGGLES AND GLASSES.

These are used for protecting the eye against flying particles of metal and emery. We have the ordinary Goggles, with wire gauze frame. Price, per pair, 20 cents, post-paid.

Many of our customers prefer what are known as "millers'" glasses. These are similar to old-fashioned "specs," but have extra large plain glasses. They are not quite as heating and oppressive to the eyes as the others. Price, per pair, 40 cts., post-paid.

CHORDAL'S OPINION ABOUT FINISH.*

*** Did you ever notice what queer notions some machinists have about finish? They don't seem to care so much about the thing when it's done, as they do about the plan of doing it. In railroad shops some one man is always harping on file finish. I have worked in more than one of these shops, and have never yet seen one of those men who could put a finish on a job with a file. The most he can do is to file a job in good shape to be finished.

This thing of getting the scratches tolerably shallow and very parallel, and then calling the surface a finished one, won't do in these days when we see good finish every day.

A finished job is a polished job. If it's a polish without proper surface under it, it don't look well; and if it has good surface without proper polish on it, it don't look well. A highly finished surface always has a high polish, and machinists condemn it because they can't do it. I like to see a well finished and highly polished surface, and it's nothing to me whether it was done with a rasp, or a file, or a grindstone, or a belt, or grit wheel, or what not.

I have never seen any good polishing which was not done by a wheel or some such rig. I have heard lots of blowing about hand finishing, but I never saw any of the finish worth blowing about.

I once saw a ten-year-old negro boy finishing flat irons on an emery wheel, and he was doing work a thousand per cent nicer and better than anything I ever saw done at a vise. * * *

*From Chordal's Letters in *American Machinist*.

EMERY GRINDERS

The line of Detroit Grinders calls for more than passing notice

Very few people consider the amount of work that is "piled onto" an Emery Grinder. A 10 inch wheel, running at regular speed, makes 2,200 revolutions a minute; about 1,300,000 in a working day, the periphery of the wheel traveling 600 miles in the same time; and a Grinder is expected to last a good many years.

The ordinary Emery Grinder is quite a simple machine to make, as there are not many parts, and no intricate ones; this is the reason, no doubt, that so many machine shops, when casting about for something to "manufacture," pitch upon the Grinder.

Some manufacturers of Emery Grinders in stating their capacity, make claims far beyond what ordinary prudence would dictate, and it is well to examine and compare critically the dimensions of various parts of different machines.

We are not "calamity howlers," but there is a great element of danger in the improper use of Emery Wheels. We have seen in a machine shop a 14x2 inch

wheel being used, running on a Grinder, having a 1 inch Spindle, Collars 3 inches diameter, and without washers between Collar and Wheel.

We sometimes wonder why there are not ten times as many Emery Wheel accidents as there are, and feel compelled to agree with the old saying, "There's a special Providence watching over Children, Drunken Men and Fools."

The capacity of Grinders, as given in table of dimensions on this page, is amply safe.

An important advantage these Grinders have over many other makes, is the longer Spindle, and greater distance between Wheels. In the larger sizes, two men can work comfortably, without crowding. They also cover sufficient floor space to prevent the jarring, which is so common a feature on many Emery Grinders with small bases.

For Washers or Gaskets to be used between the Emery Wheels and Collars, we prefer to use Rubber Packing, as it comes more uniform in thickness than leather. Good thick cardboard will answer very well, if the others are not at hand.

TABLE OF DIMENSIONS OF DETROIT GRINDERS.

No.	0	1	3	5	6	7
Length of Mandrel, inches,	14	25	36	54	40	62
Diam. of Mandrel, "	$\frac{1}{2}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2
Diam. of Collars, "		$3\frac{1}{2}$	4	7	8	8
Floor to Center of Mandrel, inches,			35	34	34	34
Distance between wheels, "	9	17	24	40		44
Base of Machine, inches,			26x30	31x37	31x37	36x38
Diameter of Cones on Mandrel, in. }		$2\frac{1}{2}$	3	4	6	6
		$3\frac{1}{2}$	4	$5\frac{1}{2}$		8
			5	$6\frac{1}{2}$	8	10
Diam. of Cones on Countershaft, in. }		12	13	15	18	16
			14	$16\frac{1}{2}$		18
		13	15	$17\frac{1}{2}$	20	20
Width of Face, inches,		$2\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	5	5
Diam. of T. & L. Pulleys, inches,		5	6	8	12	12
Width of Face, T & L. Pulleys, in.		$3\frac{1}{2}$	4	5	6	6
Weight, complete, lbs.,		175	400	700	700	1,000
Takes Wheels, up to, inches,	8	12	14	20	28	24

COMPLETENESS.—The completeness of this catalogue does not consist in showing or describing every known style of Tool or Machine. If we undertook to do this, we should have a book so unwieldy in size as to prevent its being used constantly as a book of reference, which is a most desirable feature. On the other

hand there must be a variety, in accordance with customers' requirements, and—pocket books. And this variety we have made an effort to maintain throughout catalogue. Where it has seemed necessary to present different lines of the same kind of tools, we have in all cases shown the very best in their respective classes.

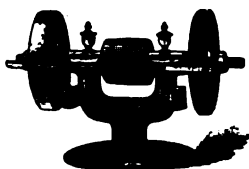


FIG. 880

NO. 0 DETROIT GRINDER.

Price, \$8.00. Countershaft, \$5.10.

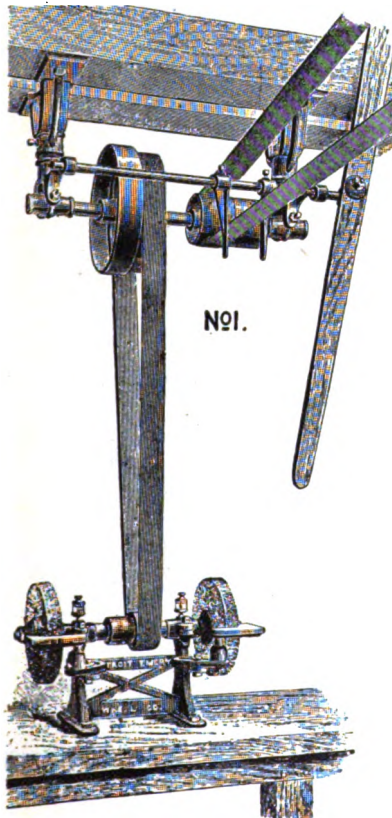
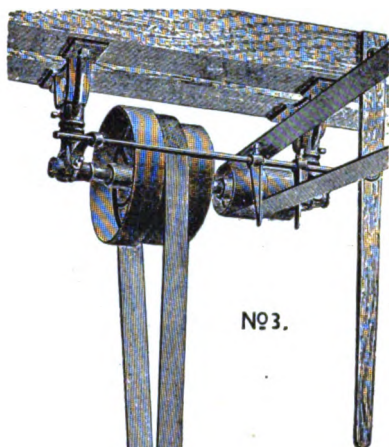


FIG. 881.

NO. 1 DETROIT GRINDER.

Price, without Countershaft, \$17.00
 " with " 25.50

For dimensions, see page 248.



NO. 3.

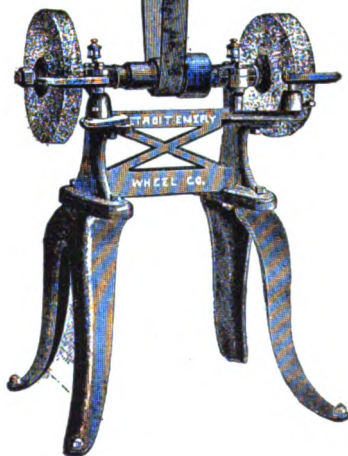


FIG. 882.

NO. 3 DETROIT GRINDER.

Price, without Countershaft, \$35.50
 " with " 38.25
 " without legs, \$4.00 less.

For dimensions, see page 248.

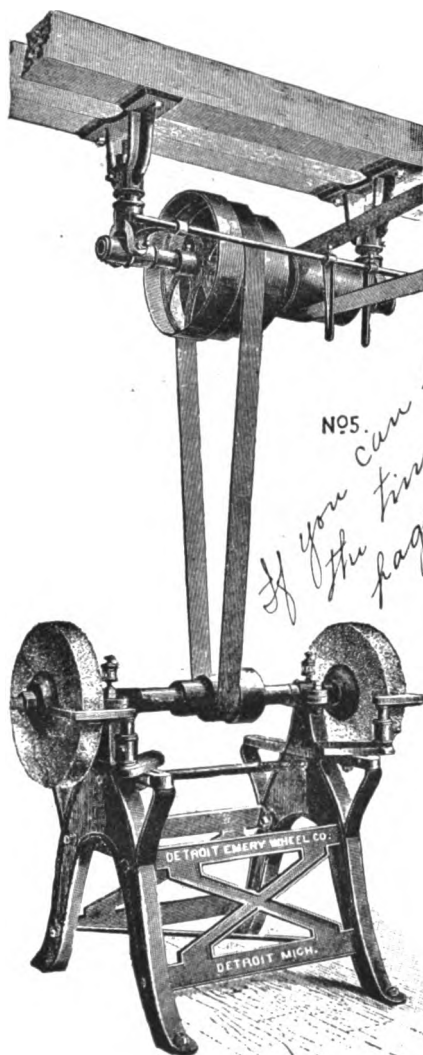


FIG. 883. NO. 5 DETROIT GRINDER.

Price, without countershaft, \$42.50
 " with " 63.75

For dimensions, see page 248.

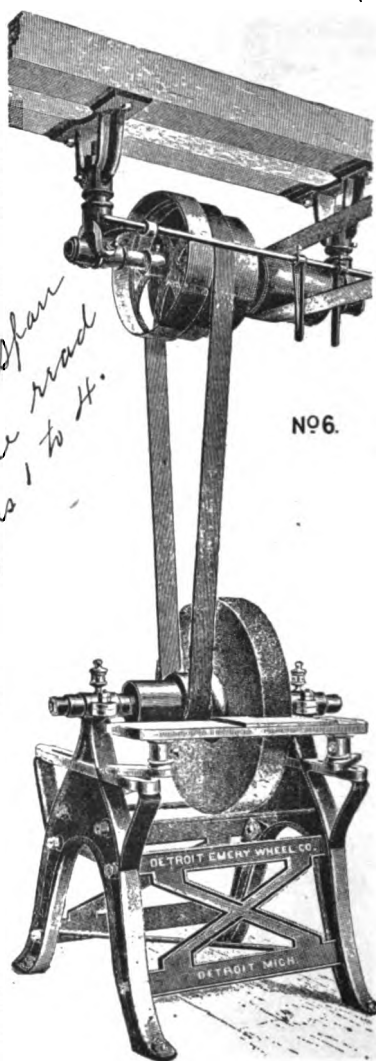


FIG. 883a. NO. 6 DETROIT GRINDER.

Price, without countershaft, \$42.50
 " with " 63.75

For dimensions, see page 248

*If you can spare
 the time read
 the pages 1 to 4.*

NO. 5.

NO. 6.

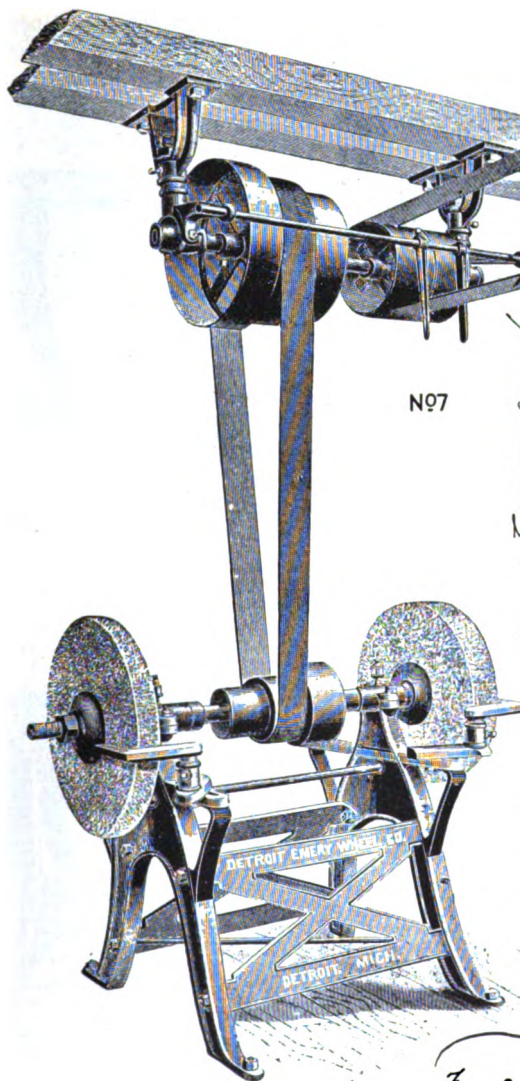


FIG. 884.

NO. 7. DETROIT GRINDER.

Price, without Countershaft.	• \$68 00	Price, with Countershaft.	\$102.00
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For dimensions, see page 248.

Wheels made entirely of wrought iron.

" " " " " "

" " partly of both air cast.

State purpose We'll make em to suit.

For some purposes

CHALLENGE EMERY GRINDERS.

FIG. 885.

NO. 1

GRINDER.

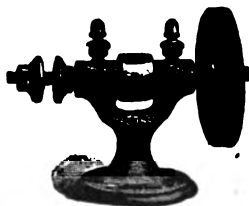


FIG. 886. BENCH GRINDER NOS. 2, 3, 4 & 5.

No.	Price.	Diam. Wheels	Thickness of Wheels.	Diam. Spindle.	Diam. Spindle bet. Flanges.	Height to Center of Spindle	Length, Spindle.
1	\$4.25	6	1	1	1	5	11
2	8.50	8	1	1	1	6	14
3	12.75	10	1 1/2	1 1/2	1	7 1/2	20
4	17.00	10	1 1/2	1 1/2	1	9 1/2	24
5	29.75	16	1 1/2	1 1/2	1 1/2	11 1/2	33



FIG. 887. FOUR WHEEL BENCH GRINDER AND BUFFER, NOS. 1, 2, 3 & 4.

These Grinders are of the same general dimensions as the regular Nos. 1, 2, 3, 4 Challenge Grinders, as given in table under Fig. 886, excepting that the Spindles are longer, being 16 1/2, 18, 28 and 31 inches respectively. They will take four wheels equivalent in size to the two wheels given in table, under Fig. 886, and should not be used with four wheels of the same size as given in this table.

No.	1	2	3	4
Price,	\$6.15	\$10.65	\$17.00	\$21.25

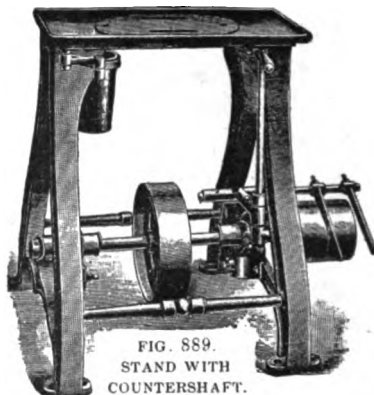
Countershafts for Challenge Grinders, see Fig. 890.

STANDS.

The Stands shown below are arranged to hold the Challenge Grinders, shown in opposite column; also, for Challenge Polishing and Buffing Machines, Fig. 924.

FIG. 888.
PLAIN STAND.

No.	Price.	Table, in	Floor Space.
1 & 2	\$8.50	12 x 10	12 x 12
3	10.25	15 x 12	14 x 13
4	12.75	20 x 12 1/2	16 x 16
5	17.00	24 x 14	16 x 16

FIG. 889.
STAND WITH
COUNTERSHAFT.

The Stand, Fig. 889, is used for Challenge Grinders Nos. 3, 4 and 5. Dimensions same as in above table.

\$21.25	\$25.50	\$34.00
No. 1,	No. 2,	No. 3,

The No. 5 Stand has Cone Pulley

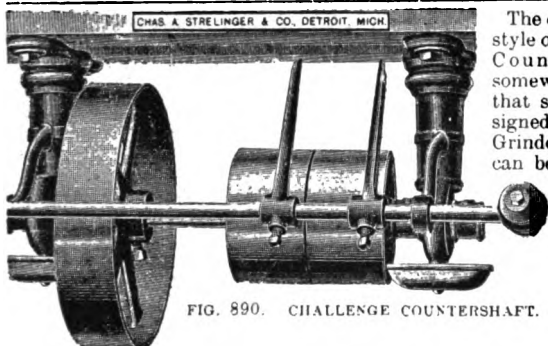


FIG. 890. CHALLENGE COUNTERSHAFT.

The cut, Fig. 890, represents the style of Nos. 2, 3 and 4 Challenge Countershafts. The No. 1 is somewhat different in form to that shown in Fig. 890, and designed especially for the No. 1 Grinder shown in Fig. 835, but it can be used for other purposes.

The No. 5 has cone pulley.

These countershafts will be found useful for many other purposes, besides being used with these Grinders. They are nicely made; moderate in price.

EXTRA COUNTERSHAFTS.

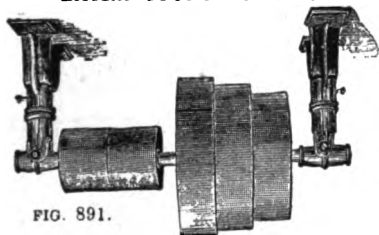


FIG. 891.

In this connection, we beg to say that we can usually furnish extra countershafts similar to those used with any of the machines shown in this catalogue, and will be pleased to give descriptions, prices and dimensions upon application.

DIMENSIONS AND PRICES.

Number.	Price.	Tight and Loose Pulleys.	Driving Pulleys.	Drop of Hanger.	Length of Shaft, ft.	Weight.
1	\$4.50	3½x1½	8x1½	6	12	25
2	6.40	5x2½	9x2½	7	18	40
3	8.50	6x3½	12x3½	7½	21	55
4	8.50	6x3½	12x3½	7½	21	55
5	12.75	7x4	9½x11x4	9½	30	110
6	17.00	7x4½	9½x11x4½	9½	30	150
7	21.25	8x4½	13x12x4½	10	38	165
8	29.75	10x4½	16x18x5½	12	54	300

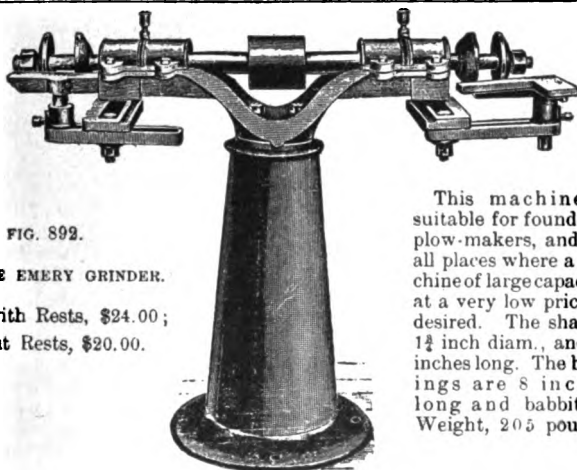


FIG. 892.

CYCLONE EMERY GRINDER.

Price, with Rests, \$24.00;

without Rests, \$20.00.

This machine, is suitable for foundries, plow-makers, and for all places where a machine of large capacity, at a very low price, is desired. The shaft is 1½ inch diam., and 42 inches long. The bearings are 8 inches long and babbitted, Weight, 205 pounds.

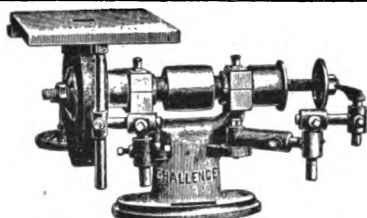


FIG. 893. CHALLENGE SURFACE GRINDER.

Fig. 893 represents a simple form of Bench Surface Grinder. These are made in three sizes, as per specifications and prices below:

		No. 3.	No. 4.	No. 5.
Takes Wheels,	{ Diameter,	10 in.	12 in.	16 in.
	{ Thickness,	1 1/2 "	2 "	2 "
	{ Size Hole,	1 "	1 "	1 1/4 "
Bench Machine,		\$29.75	\$38.25	\$59.50
On Stand,		40.00	51.00	76.50
Countershaft,		8.50	8.50	12.75

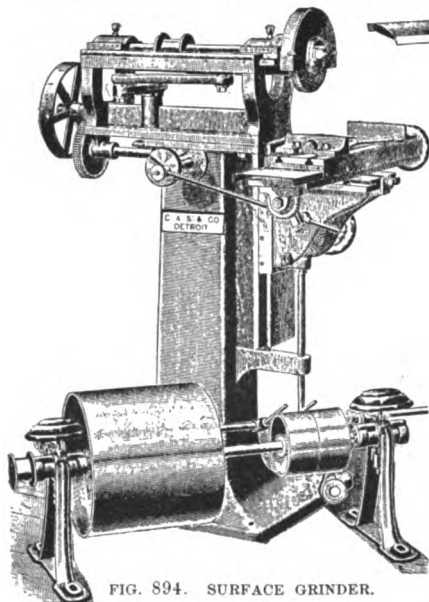


FIG. 894. SURFACE GRINDER.

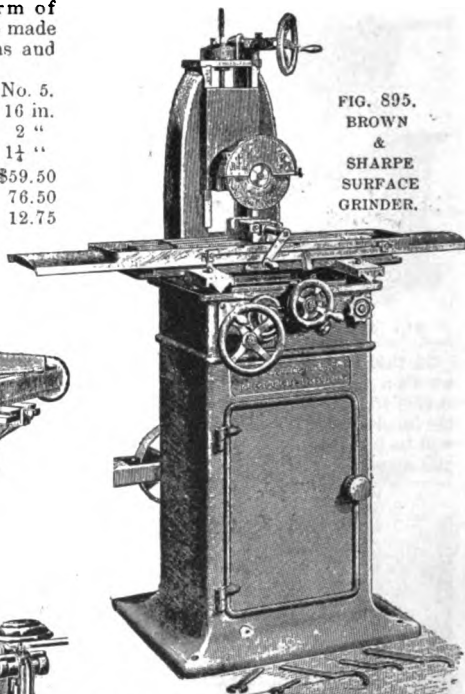
This machine is adapted for grinding and finishing hardened dies and punches and parts of machinery requiring true surfaces.

The spindle and boxes are in a slide, which carries the wheel across the work.

The wheel cutting in this way does very perfect work. The length of the stroke is adjusted by a crank.

It has automatic feed, and feeds in either direction. Using an 8 inch wheel, a piece 12 inches high, 8 inches wide, and 18 inches long, can be ground. Price, complete with countershaft, \$250.00.

No. 2 will grind 14 inches wide, 12 inches high and 18 inches long. Price, complete with countershaft, \$300.00.

FIG. 895.
BROWN
&
SHARPE
SURFACE
GRINDER.

This machine grinds work up to 18 inches long, 6 inches wide and 5 inches high, using a wheel 6 inches in diameter.

The travel of table is automatic in either direction; Spindle can be raised or lowered by means of a hand wheel, graduated to read to thousandths of an inch.

This machine is doubtless the finest Surface Grinder in the market, the Brown & Sharpe Mfg. Co. being the leaders in fine and accurate Grinding Machinery. Prices upon application.

HORNER SURFACE GRINDER.

This machine is designed for grinding and finishing, blanking, piercing, and stamping dies, or any flat surfaces, and will cover quite a range of work of that character; is also provided at rear end of spindle with wheel for ordinary grinding; it has table $9\frac{1}{4}$ inches wide, 8 inches long, hinged at one end, and provided with vertical adjusting screw under opposite end. The bracket to which table is fixed has a vertical motion of 10 inches, allowing the table to be raised within $2\frac{1}{4}$ inches of center of spindle, and can be readily raised and lowered and clamped in any position.

Spindle is steel, running in superior bearings, which are protected from dust and are adjustable for wear, and carries two wheels, 10 inches diameter, $\frac{1}{4}$ inch thick.

Height from floor to center of spindle, 45 inches; length of spindle, 23 inches; distance between wheels, 17 inches; diameter of bearings, $1\frac{1}{2}$ inches.

Price, without countershaft, \$71.00; with countershaft, \$80.00. Weight, complete, 830 lbs.

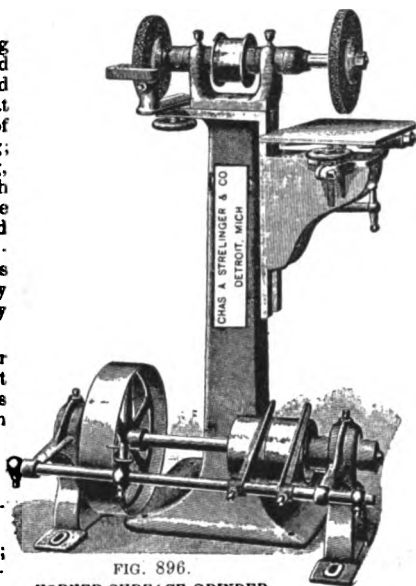


FIG. 896.

HORNER SURFACE GRINDER.**UNIVERSAL GRINDING MACHINE.**

The Brown & Sharpe Mfg. Co. are not only the pioneers, but are the originators of Universal Grinding Machinery. They have added improvements from time to time, and we believe that in the line of Universal, Surface, and Cutter & Reamer Grinders, their product

is superior to all others.

We have in constant use in our own works a number of their Grinding Machines, and would be pleased to furnish any information that lies in our power regarding the use of these machines. Large descriptive pamphlets and circulars, with prices, will be sent upon application.

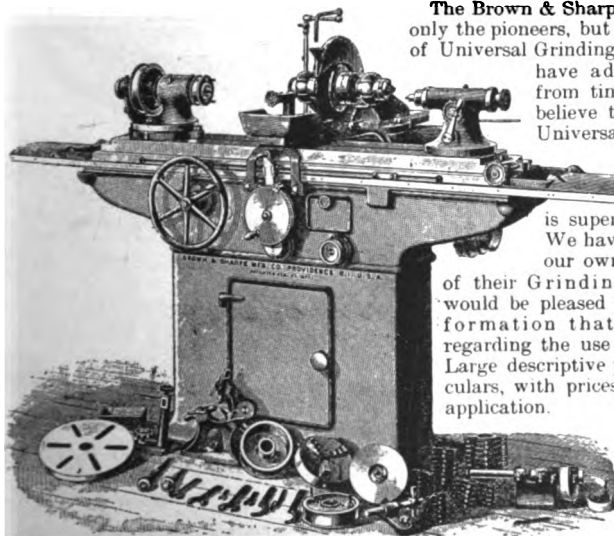


FIG. 897.

**BROWN & SHARPE
UNIVERSAL
GRINDER**

CUTTER AND REAMER GRINDERS.

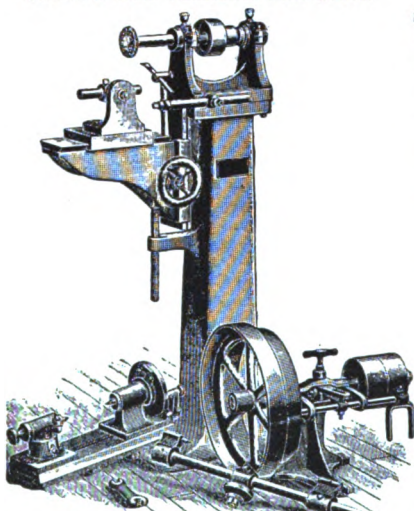


FIG. 898. WOODWARD CUTTER GRINDER.

Fig. 898 is adapted for grinding all kinds of Cutters and Reamers, straight, taper, bevel or spiral.

The index centers shown in cut are for grinding cutters without the guide rest or finger against the tooth; such cutters as the Brown & Sharpe Mfg. Co.'s gear cutters, and cutters requiring the face of the tooth to be ground.

The index is fitted with a worm gear and worm for fine adjustment in regulating the cut, without changing the pawl from the index. Centers swing 6 inches diameter. Price, \$90.00; centers, extra, \$37.00; surface grinding attachment, \$50.00.

Fig 900 is used for sharpening straight and taper, shell or shank reamers, and for grinding edge and bevel cutters of any angle; straddle and face mills; cotter and hollow mills. and straight or taper milling cutters, cut either straight or spiral, with holes or shanks. It can also be used for sharpening worm and thread tools.

Machine takes 18 inches between centers, and takes cutters and shell reamers not exceeding 6 inches in diameter and 7 inches in length.

Special circulars, fully descriptive, and prices, upon application.

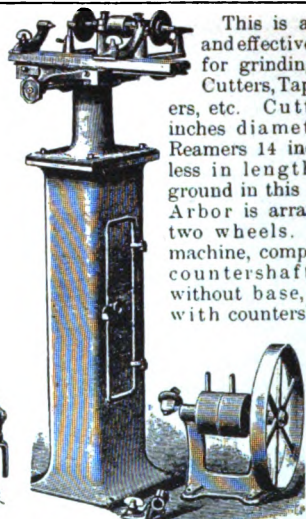


FIG. 899

WELL'S
CUTTER
GRINDER

This is a simple and effective machine for grinding Milling Cutters, Taps, Reamers, etc. Cutters to 6 inches diameter, and Reamers 14 inches and less in length can be ground in this machine. Arbor is arranged for two wheels. Price of machine, complete with countershaft, \$62.00; without base, complete with countershaft, \$50.

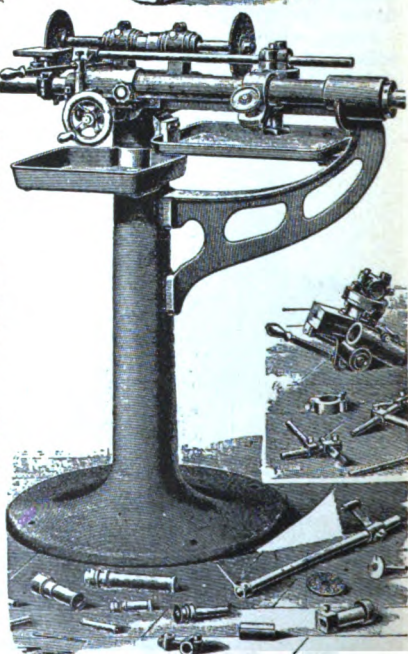


FIG. 900. BROWN & SHARPE UNIVERSAL CUTTER AND REAMER GRINDER.

ECONOMY OF MACHINE SHOPS FOR ELECTRIC STREET RAILWAYS.

BY JOHN F. BICKFORD

The evolution of the electric motor has been so rapid that no definite methods have yet been established for its care and maintenance. There is a great lack of uniformity in the operation of roads, and one can hardly find two which are following the same course as regards repairs and renewals to motor equipment. Let us look still farther into the subject and ascertain what else is needed to bring about true economy.

There is no denying the fact that, to do a piece of work of any kind properly, we must have proper tools; a makeshift in such a case only leads to the abominable temporary hitch. To do a thing half-way results in gross extravagance in the end. There is no denying this; we have samples of it already on the electric railway. If this be true, what conclusion follows, in view of our previous conclusion?—(that we must employ the skilled mechanic) Simply that we must provide him with the requisite tools and machinery to do the work in a skillful manner.

Now that we have arrived at this latter conclusion, there is yet another step, the last, but by no means the least. It is this: How far shall we carry this equipment of the machine shop? Shall we make it a manufacturing establishment? There is surely a point here where we must draw the line. There is a distinction between repairs and renewals; but for all this the question arises whether, if we go so far as to establish a shop for repairs, is it best to go a little further and manufacture supply parts?

In this connection I wish to call your attention to the methods and practices of the steam railroads. It seems to me that we ought to a certain extent to be guided by these people. They have spent over half a century in probing and sounding this matter of repairs and renewals, and even though we may not wish to follow their example in some things, it will surely be worth our while to consider what they are doing. We find here what we have arrived at through our conclusions, viz: complete repair shop equipped with all the necessary machinery for doing the work in a thorough and economical manner. and as far as certain re-

pairs are concerned, they know positively that such can be done in their own shops more satisfactorily than in a local machine shop. Their own men having become familiar with all the requirements of the work, they know every condition under which the apparatus has to work, consequently the successful and economical operation of the road, so far as this department is concerned, is assured. In some instances it may cost a trifle more to make the article than it could be bought for. Suppose it does. If it will give better service and wear longer, it is more economical. As I said at the beginning, economy does not always consist in buying a thing cheap. Happily, however, in the experience of the steam roads they have found that it costs no more, and in many cases not so much, as to buy of supply companies, which is surely a conclusive proof that it is economical to maintain shops.

After viewing the experience of the steam roads, let us turn our attention to the substantial practical data which I have gathered from the more prominent electric roads. Among these answers received from 66 roads, I have found many things to strengthen my belief that it is economical to maintain a machine shop, not only for repairs, but for the manufacture of supply parts. It turns out to be a fact that no less than 24 roads are maintaining machine shops, doing all their own repairs, and manufacturing many supply parts. They say unhesitatingly that there is economy in so doing. They give as their reasons: First that they can make better material than they can buy; that they are perfectly familiar with the requirements and conditions of the business; they are operating the road, and are in a position to know just what is needed, and are better able to judge of the strength and durability of the apparatus than those who have never been in a similar position. Is not this a natural consequence? A second reason given is, that there is a saving of from 25 to 50 per cent by manufacturing the majority of parts.

What further, then, can we say? Is not this, coupled with the experience of the steam roads, sufficient to enable us to conclude that there must be economy in machine shops for electric street railways?

The Economy of Machine Shops for Electric Street Railways may be suggested by the article

TOOL GRINDER.

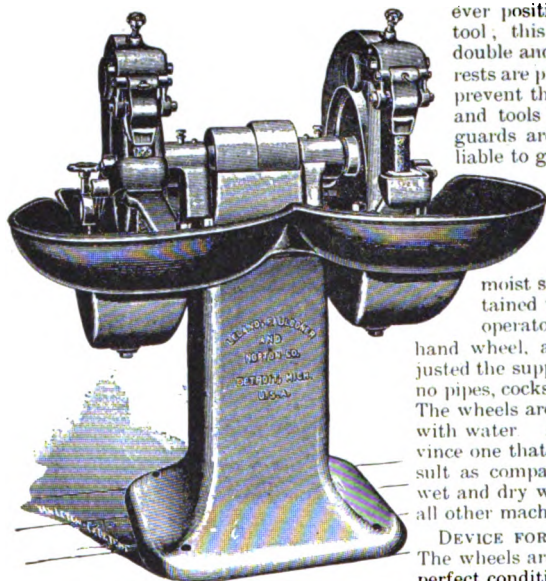


FIG. 901. TOOL GRINDER.

DIMENSIONS.—Spindle Bearings, 2½ inches, 8 inches long; Emery Wheels, 24 inches diameter, 1½ inch face; Distance between Wheels, 25½ inches; Weight, crated for shipment, 1750 lbs.

Price of Machine, complete, with Overhead Works and Two Emery Wheels, \$200.00.

This Machine has a constant and uniform water supply, under complete control of the operator, by a most unique and ingenious device. Is designed to overcome the objectionable features of the time-honored grindstone, and the modern "Wet Emery Wheel Tool Grinder."

A feature of this machine is its freedom from annoying contrivances. It has no pumps, hose, piping, sieves, settling tanks, cupboard doors, wet pump belts, filters, chains or treadles. No other machine made but that has some, or most of these objectionable features.

DESCRIPTION.—The front of the water pan is in the form of two half-round bowls, the cutting faces of the wheels being in the center of each bowl; the operator may always stand at the same

distance from the wheels, in whatever position he wishes to hold the tool; this is a new feature in both double and single tool grinders. The rests are provided with guards, which prevent the spray from rusting work and tools near the machine; these guards are simple, positive, and not liable to get out of order.

WATER SUPPLY.—The water supply may be perfectly regulated by the operator. Any desired amount, from a slightly moist stone to a flood, may be obtained without wetting either the operator or the floor, by turning a hand wheel, and after the water is adjusted the supply is constant, as there are no pipes, cocks or pumps to clog the flow. The wheels are thus constantly saturated with water. A little reflection will convince one that this is a very desirable result as compared with the intermittent wet and dry wheel, which is a feature of all other machines.

DEVICE FOR KEEPING WHEELS TRUE.—The wheels are kept true and in the most perfect condition for their work, *without the use of a diamond*, with its inevitable extravagance in money and time. This result is accomplished by simply turning a small hand wheel. It can be done at any time without in the least interfering with the work, or removing the rest, or any part of the machine, and requires but *an instant to make them perfectly true*.

QUALITY OF WORKMANSHIP AND MATERIAL.—It has been designed with great care to meet all the necessities of this class of work, the materials are the best obtainable; spindle of crucible steel carefully ground to size, bolts and studs (where essential) of bronze metal; collars are turned all over, insuring a perfect balance. Dimensions ample, as will be seen by list elsewhere.

PROVIDENCE, R. I., Feb. 7, 1893.

Gentlemen:—In regard to your No. 9 Tool Grinder, we would say that we ordered the first one in January, 1891. We liked this so well, that a second was ordered in March, 1892, a third was required in April, and a fourth in November, 1892.

All of these machines, except the first, were ordered at the earnest solicitations

of foremen of the various departments in which they are used, and all of the foremen had used other makes of grinders, either in our works or elsewhere. Thus far, all the machines have given satisfaction.

The characteristics we especially like are the unique and satisfactory method of water supply, and the design and arrangement of the truing rolls. The former is efficient and complete, and the latter does away with the expense and time occupied in preparing to use a diamond. They leave the wheel in better condition, and offer no excuse for having a wheel out of perfect order. The minor excellencies referred to in your circular seem also to be appreciated by our foremen.

Yours truly,
BROWN & SHARPE MFG. CO.

CHICAGO, Feb. 1, 1893.

Gentlemen:—Replying to your communication of January 19th, we have to say that we are using three of your No. 2 Tool Grinders. We handed your letter to our foreman, Mr. Geo. A. Bates, who has had large experience in the shops in the East, and he returned the letter to us, with this indorsement: "It is the best Emery Tool Grinder I have ever used or seen." We should endorse his judgment.

Very truly yours,
WEBSTER MFG. CO.

CINCINNATI, Jan 23, 1893.

Gentlemen:—We have had one of your No. 2 Tool Grinder in use nearly two years, and have found it perfectly reliable. Having been among the first in this country to use water grinders for grinding lathe and planer tools, we are enabled to judge of the comparative merits of the different machines on the market, and we are pleased to report that your machine has several points of superiority, especially the devices for watering and truing wheels. We also like the machine on account of its design and workmanship. The cleanliness of the machine should recommend it to those who care to keep their shops neat and clean, as we find there is no trouble with leaky pumps and splashing water. We cheerfully recommend your machine as being the best for the purpose.

Yours very truly,
THE G. A. GRAY CO.

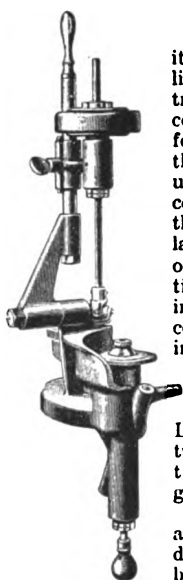


FIG. 902.
CENTER GRINDER have been "trappy" affairs, that were used a few times, and then "Put on the shelf."

The Machine shown here is thoroughly practical, and should be in use in every shop. The manufacturers have published a very interesting little book relating to this machine and Lathe Centers, which we will send to any one upon application.

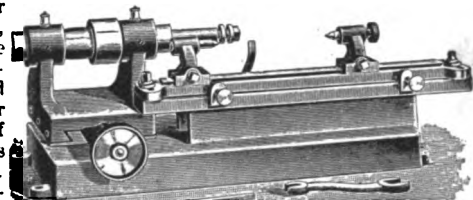


FIG. 903. REAMER GRINDER.

Designed more especially for use in brass-finishing shops, for grinding the reamers used in this class of work. It will take reamers of any length up to 12 inches, and any diameter to $3\frac{1}{4}$ inches. Spirally fluted, straight or taper reamers, are readily ground, the swivel being graduated to easily adjust to required taper.

Price, with Countershaft, \$85.00.

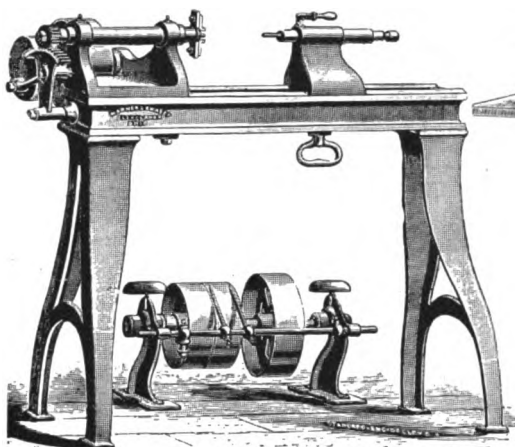


FIG. 904. COCK GRINDER

This machine is designed for grinding in keys for steam, water and gas cocks up to 2 inches diameter. The Spindle is rotated by a reciprocating segment, which gives $1\frac{1}{4}$ revolutions alternately in each direction.

Price, complete, with Counter-shaft, \$95.00.



FIG. 905. GRINDSTONE.

The above Grindstone is admirably adapted for the use of carpenters, pattern-makers, and in fact all places where edge tools are employed. Is made of hardwood, the Grindstone is well mounted, and is about 17 inches in diameter by 2 inch face. Price, complete, \$3.75.

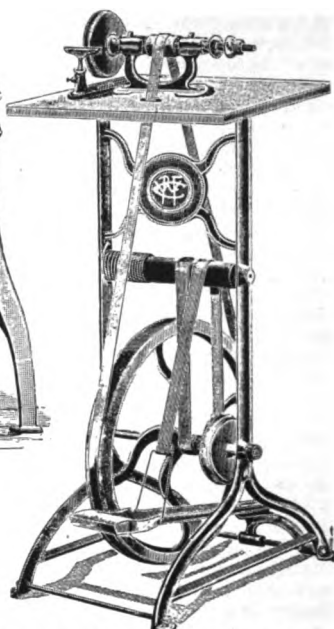


FIG. 906. FOOT POWER GRINDER.

The above cut illustrates the only practical Foot Power Grinder that we know of. Most Grinders of this class are arranged to run the wheel at from 300 to 500 revolutions per minute, and this is not sufficient speed to produce anything like good results, as a 6 inch wheel should make at least 2000 turns per minute.

In the above machine, the Spindle can be speeded to 2500 revolutions. It will take any size wheel up to 7 inches diam. and $1\frac{1}{4}$ inches thick.

Price complete, without wheels, \$15.00.

The COMPLETENESS of this CATALOGUE does not consist in showing or describing every known style of Tool or Machine. If we undertook to do this, its size would prevent its being used constantly as a book of reference, which, in itself, is a most desirable feature.

On the other hand, there must be variety, in accordance with customers' requirements, and—pocket books And this variety we have made an effort to maintain throughout the catalogue.



FIG. 906. KNIFE AND SCISSORS SHARPENER.

This little machine will be found very convenient for household and office use; has a guide for knives and scissors, to assist in sharpening the same. Price, as shown in cut, \$1.50.

SAW GUMMERS.

These machines have been on the market for some six or seven years, and have met with great success. We will guarantee them to do everything that is claimed for them.

It has been proven by experience, that saws regularly filed on these machines do more and better work, take less power, and keep sharp longer than those filed by hand. They not only sharpen the teeth perfectly in less than one-third of the time required by hand filing, but keep them gummed and uniform in size and shape. The saws are kept perfectly round, and the

teeth all project the same distance from the center. There are upwards of forty of these machines in use in saw mills, planing mills and factories in our own city, and we have never heard a single complaint. They take the place most effectively of the expensive and complicated machines sold for the same purpose, and we will be glad to send them out on trial to responsible parties.

The No. 1 machine is especially adapted for sharpening rip and cross-cut circular saws, from 6 to 40 inches in diameter.

No. 1, Semi-Automatic; price, \$50.00, including Setting Block, 3 Emery Wheels, Belt, Guard over wheel and table.

Attachment for sharpening band saws $\frac{1}{4}$ to 3 inches wide, having teeth $\frac{1}{4}$ to $2\frac{1}{4}$ inches apart, \$10.00.

ROGERS' SAW GUMMER, NO. 2.

The No. 2 Machine is designed for shingle saws and small saws about saw-mills; is suitable for cross-cut and rip saws from 8 to 48 inches in diameter.

No. 2, Semi-Automatic; price, \$65.00, including three Emery Wheels.

No. 3, Semi-Automatic; price, \$75.00, for saws from 8 to 72 inches in diameter.

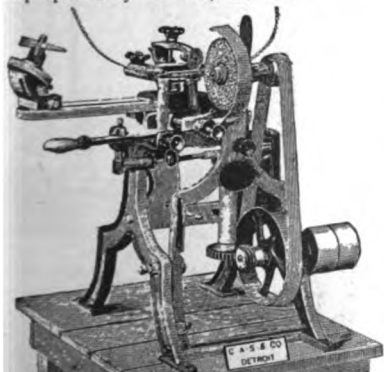


FIG. 907. ROGERS' SAW FILER AND GUMMER, NO. 1, WITH BAND SAW ATTACHMENT.

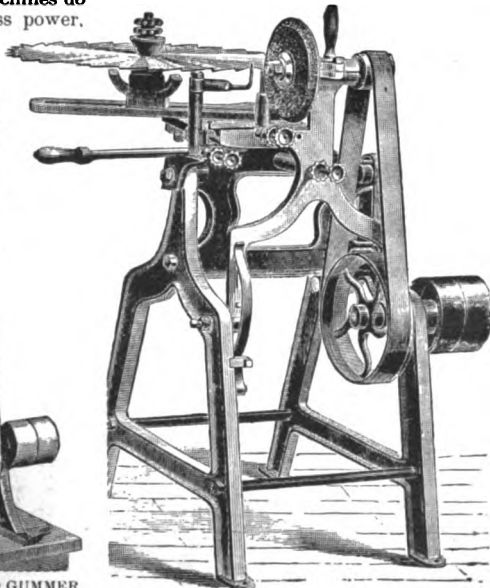


FIG. 908. ROGERS' SAW GUMMER, NO. 2.

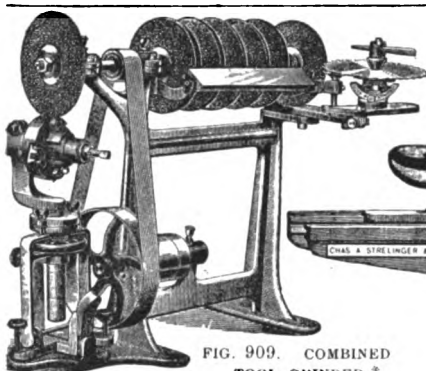


FIG. 909. COMBINED TOOL GRINDER.*

This Grinder when complete, as shown in cut, comprises a Tool Grinder carrying five emery wheels of different shapes and sizes, for knives and tools; a Head Grinder for Shimer Heads, which is a practical rig in every respect, and a simple and accurate form of Saw Gummer.

Tool Grinder,	\$40.00
Head Grinding Attachment,	15.00
Saw Gummering Attachment,	10.00
Machine, with all Attachments, as shown in cut,	65.00
For grinding Shimer Heads only,	35.00

BUFFALO KNIFE GRINDER.*

This machine, Fig. 911, was brought out about two years ago, and has met with great success. It will, in four cases out of five, take the place of the Automatic Knife Grinding Machines which are sold at from three to four times the price. It is automatic in its action; can be used with or without water; will grind a flat, bevel or any desired concave.

Prices, including Wheel:

For Knives to 26 inches,	\$75.00
" " " 32 "	85.00
" " " 44 "	105.00
" " " 54 "	130.00

Water Pot and Fixtures extra, \$10.00.

*We would ask for more than a passing glance at these two Machines. They stand very close at the top of the list of Labor-Saving Machines, and in connection with the Saw Filing Machines, on page 261, form a combination that will make a profitable investment for any one who uses Wood-working Machinery.

KNIFE GRINDER.

The Knife Grinder, Fig. 910, is a very convenient device for grinding Planer Knives, Bits, etc. The frame or base is planed and scraped to an ac-

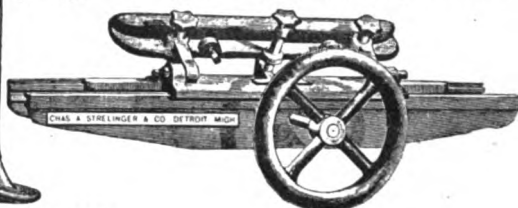


FIG. 910.

curate fit, making the sliding carriage on it fit nicely and work with ease. The plates and jaws which hold the knife are hinged to the sliding carriage, and can be adjusted to any angle or bevel. This machine can be attached to almost any grindstone or emery wheel frame. Price, complete, as shown in cut, \$30.00.

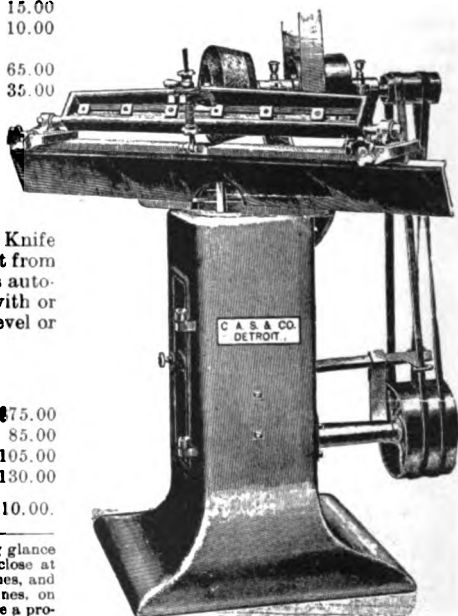


FIG. 911. BUFFALO KNIFE GRINDER.

AUTOMATIC KNIFE GRINDER.

This machine, Fig. 912, is designed to grind knives or other work 30 inches long. It has Automatic Power Feed. The angle iron upon which the knife or work to be ground is held, is arranged with slot provided so that the emery wheel will grind directly towards the edge of the knife. The angle iron can be reversed and the knife ground towards the butt or away from the edge. The table or platen upon which the angle iron (holding the knife) is held, brings the work to the wheel by small hand screw wheels at each end of the platen.

Long bearings are an especial feature of the machine, with every provision known in our experience for excluding the emery dust. The platen or table is exceptionally wide, furnished with extra width of ways to traverse upon. The machine is made with tight and loose pulley, or single pulley.

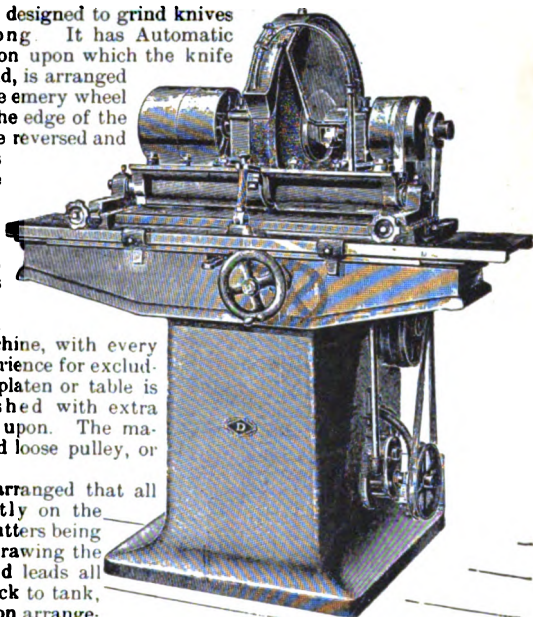
The water hood is so arranged that all water is distributed directly on the wheel in front of knife or cutters being ground, and thus prevents drawing the temper. The inside hood leads all water and spray directly back to tank, which has a patent syphon arrangement connecting with the lower tank. This device avoids depositing the grit and sediment which falls in upper tank from wheel in the lower tank, and does not therefore get in the pump to clog the pipe and wear out the gears.

The pump is made entirely of brass upon a new and improved principle, being compact, well made, and non-corrosive.

Size of hase on floor, 26 x 21 inches; height from floor to center of spindle, 38 in.

The prices on these include wheel. On the 26 and 30 inch machines, the wheels are 22 inches in diameter; on the larger machine, 26 inches in diameter.

This machine can be used for balancing planer knives, moulding knives, revolving cutters of every shape, as well as the screws used in securing the knives to the head. If a set of knives or bits is balanced with this principle, and the head upon which the knives are used is in balance, the machine will run absolutely true. Price of Knife Balancing machine, \$15.00.

**FIG. 912. AUTOMATIC KNIFE GRINDER.**

26 inch Grinder,	\$148.75;	Wgt., 1000 lbs.
30 " " "	170.00	" 1300 "
36 " " "	212.50	" 1400 "
50 " " "	255.00	" 1600 "
60 " " "	297.50	" 2500 "
80 " " "	382.50	" 3000 "

For Automatic Lateral Feed add to above prices, \$21.25.

For Automatic Pump and Connections add to above prices, \$21.25.

Price of Countershaft for this machine, \$15.30. Countershaft has T. & L. pulleys 8 x 4½, driving pulley 13 x 4½ inches.

**FIG. 913.**

SEYMOUR'S PROPORTIONAL KNIFE BALANCING MACHINE.

Price of Knife Balancing machine, \$15.00.

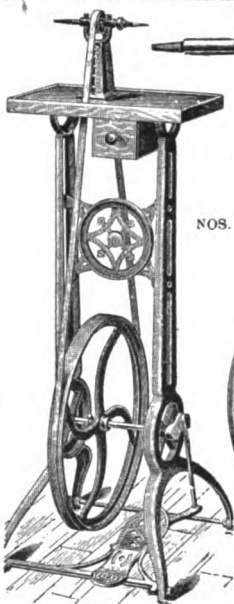


FIG. 914.
NO. 0, POLISHING LATHE

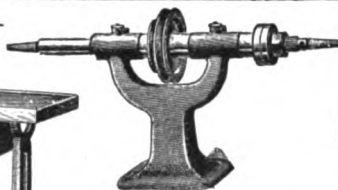


FIG. 917.
NOS. 2 & 3, POLISHING HEADS.



FIG. 918.
FOOT WHEEL.

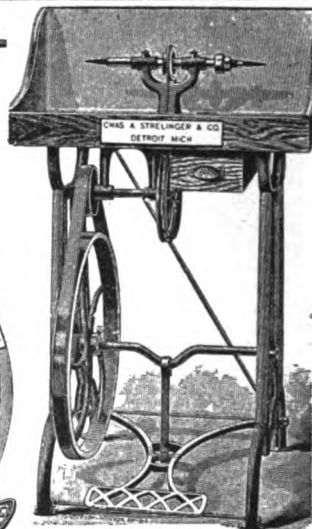


FIG. 920.
IMPROVED POLISHING LATHE.

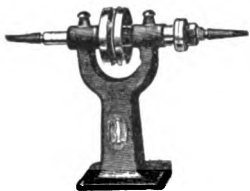


FIG. 915.
NO. 1, POLISHING HEAD

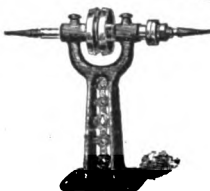


FIG. 919.
NO. 0, POLISHING HEAD

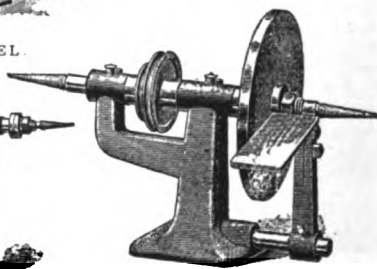


FIG. 921.
LAP HEAD.

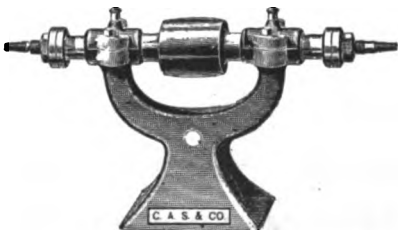


FIG. 916.
NO. 4, POLISHING HEAD

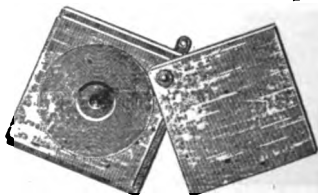


FIG. 922.
METAL LAP.

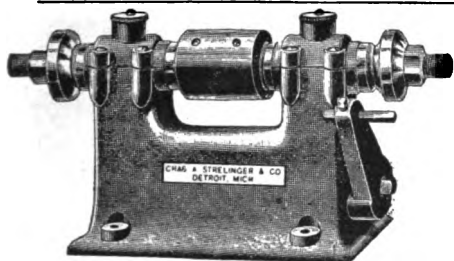


FIG. 923. POWER LAP HEAD.
POLISHING HEADS

No. 0, Fig. 919, \$1.25, is 6 inches high; steel spindle 8 inches long and $\frac{1}{2}$ inch diameter. Can be run by a flat or round belt.

No. 1, Fig. 915, \$2.00, is 6 inches high; steel spindle 10 inches long and $\frac{1}{2}$ inch diameter. Is constructed in the same manner as No. 0, but is heavier and has wider bearing surfaces.

No. 2, Fig. 917, \$4.00 Length of spindle 13 inches; this head has a ground spindle and is superior to the preceding one. It is not made with flat pulley.

No. 3, Fig. 917, \$7.00 Length of spindle 18 inches; this Head is our best. Has long bearing surfaces and a ground spindle. As shown in cut, Fig. 920, it is used in connection with Polishing Lathes, but we can furnish it adapted for power, either with single flat pulley, or tight and loose pulleys, as ordered.

No. 1 Countershaft, with 8 inch flat pulley, \$4.00.

No. 2 Countershaft, with 10 inch flat pulley, \$7.00.

No. 4, Fig. 916, \$12.00 Length of spindle 22 inches; this is a strong and well built Head. The spindle is ground perfectly true, and has babbitted boxes. Furnished with tight and loose pulleys, if desired.

No. 2 Countershaft, with 10 inch flat pulley, \$7.00.

No. 3 Countershaft, with 10 inch flat pulley, \$10.00.

POLISHING LATHES.

No. 0, Fig. 914, \$7.00 This lathe is now built with a grooved drive way, and is furnished with a round belt. The table top, of hard wood, is 9x15 inches, with a raised edge to keep tools from rolling off.

No. 1, \$7.75, is the same stand as the No. 0, but with No. 1 Head (see Fig. 915).

(17)

No. 2 Improved, Fig. 920. Without Head, \$15.00; with No. 2 Head, \$18.00; with No. 3 Head (as in cut), \$20.00; with No. 3 Lap Head, \$23.00.

The top of this lathe is of finely seasoned wood, lined with heavy zinc, and well finished throughout. It has iron collars to protect belt holes, and a large drawer. Both shafts are made of steel.

The driving pulley is 24 inches in diameter, and belts to a countershaft, on which are pulleys 5 and 10 inches in diameter respectively, by which the great amount of speed required can be produced. It occupies a floor space of 24x30 inches, and stands 40 inches high at the front. Weight, 165 lbs.

LAP HEADS.

No. 3, Fig. 921 Price, without Lap, \$8.00 This machine is made with brush tapers at each end of spindle, in addition to the Rest. This rest can be adjusted to any angle, and the use of it will greatly assist in the lapping of difficult pieces. Furnished with tight and loose pulleys for Power, if desired.

No. 1 Countershaft, with 8 inch flat pulley, \$4.00.

No. 2 Countershaft, with 10 inch flat pulley, \$7.00.

No. 5 Power Lap Head, Fig. 923. Price, without Lap, \$16.00. This is a strong and well made Head; the boxes are wide and well babbitted. The arm is used at either end as a tool rest for turning off the ends of the Laps. This machine will carry two Laps, from 10 to 14 inches diameter.

Laps, per inch in diameter, \$1.00. We can furnish these from 4 to 14 inches in diameter, and charge them with emery or corundum, coarse and fine, on one or both sides, as ordered. In ordering, give exact size of spindle they are to fit.

Fig. 922 represents a Lap and the box in which we ship them. This box will be found very serviceable for holding the Lap when not in use.

FOOT WHEELS.

The Wheel illustrated in Fig. 918, is 18 inches in diameter, well made and moderate in price.

No. 1, grooved face, \$3.00; No. 2, flat face, \$2.75.

On page 186 we illustrate in Fig. 715, an Improved Foot Wheel.

POLISHING MACHINES.

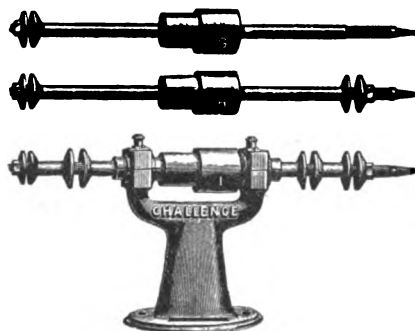


FIG. 924. CHALLENGE POLISHING MACHINE.

These machines are designed for polishing and buffing. We can furnish them with any of the nine styles of Spindles shown below. The styles of Spindles in most common use are the "B" and "E," and nine-tenths of our sales are of these.

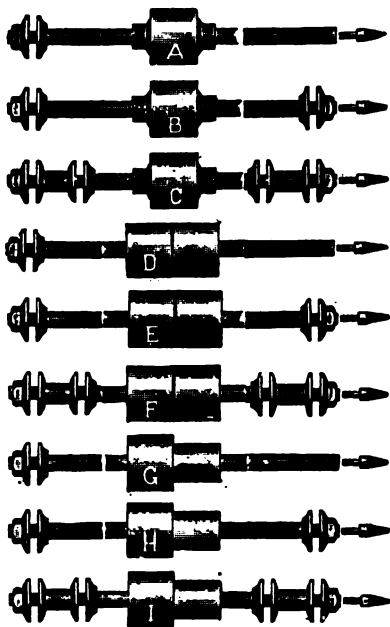


FIG. 925. POLISHING MACHINE SPINDLES.

Made in three sizes, numbers B, 3 and 5.

DIMENSIONS AND PRICES.

Number,	B	3	5
Height to center of Spindle,	8	12	15 in.
Length of Spindle,	24	36	40 "
Diam. of Spindle,	$\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$ "
Bearings,	3 x 1	$4\frac{1}{2}$ x $1\frac{1}{2}$	5 x $1\frac{1}{2}$
With Spindle A,		\$17.50	\$24.25
With " B,	\$12.00	19.10	27.25
With " C,	14.00	20.85	29.00
With " D or G,		18.75	25.50
With " E or H,		20.40	27.25
With " F or I,		22.10	28.90

For prices of Countershafts, see page 253; for prices of Plain Stands, see page 252; for prices of Combined Countershaft and Stand, see page 252.



FIG. 926. PROJECTING POLISHING LATHE.

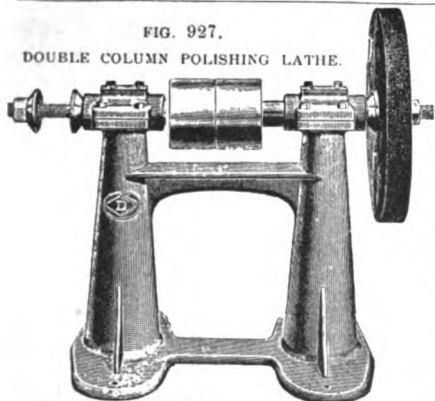
This machine bows over towards the workman, throwing the wheels away from bench; is largely used for polishing tubes, cylinders, hollow-ware, etc. It stands 20 inches high; projects 20 inches. Spindle is 30 inches long, $1\frac{1}{4}$ inches on bearing, and 1 inch diameter between flanges. Weight, 150 lbs. Price, \$21.25.

DOUBLE COLUMN POLISHING LATHE.

(SEE FIG. 927.)

This Lathe is especially useful for running wood or leather wheels, or large cotton buffs, at a high speed. Has steel spindle 38 inches long, $1\frac{1}{4}$ inches diameter between flanges. Bearings, 7 inches long. Price, with single pulley, \$21.25; with tight and loose pulleys, \$25.50

FIG. 927.
DOUBLE COLUMN POLISHING LATHE.



including 2 flanged pulleys, 12 and 6 inches diameter, 1 inch hole, $2\frac{1}{2}$ inches between flanges, \$25.50.

We can furnish flanged pulleys, with $\frac{1}{4}$, 1 or $1\frac{1}{2}$ inch hole, any width between flanges up to 6 inches. Prices for other size pulleys will be named upon application.

We can also furnish a lighter Strapping Attachment, of the same general style, with the same size pulleys. Price \$21.25. And a larger, heavier Attachment, using flange pulleys 14 and 18 inches, with 4 inch face. Price, \$42.50.

ENDLESS POLISHING BELTS.

We carry 12 ft. Belts in stock; other sizes furnished to order. These are made of two thickness of heavy duck, with a layer of vulcanized rubber between, and are considered as being the best Polishing Belts.

Width.	Per Ft.	Width.	Per Ft.
1 inch,	\$0.10	3 inch,	\$0.27
$1\frac{1}{2}$ "	.15	4 "	.36
2 "	.19	5 "	.45
$2\frac{1}{2}$ "	.25	6 "	.54

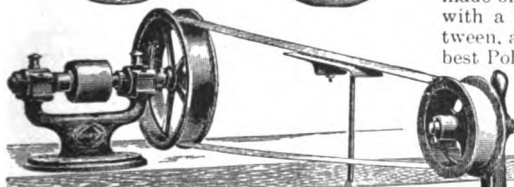


FIG. 928. BELT STRAPPING MACHINE "B."

The above cut shows a Belt Strapping Attachment, arranged in connection with a Polishing or Strapping Head. It is practically adapted to all kinds and shapes of articles in hardware, and other metals where the ordinary polishing wheel cannot be used. Price of Strapping Head only, as shown on bench, \$12.75, price of same, with cone pulley, \$15.

Price of countershaft, with tight and loose, and single pulley, \$10.20.

Price of countershaft, with tight and loose, and cone pulley, \$14.00.

The Belt Strapping Attachment can be fastened to any part of the floor. The operator can detach belt almost instantly, by slacking up the jointed standard fastened to the floor. When not in use, it can be folded in a small space.

Price, of Strapping Attachment only.

COTTON POLISHING BELTS.

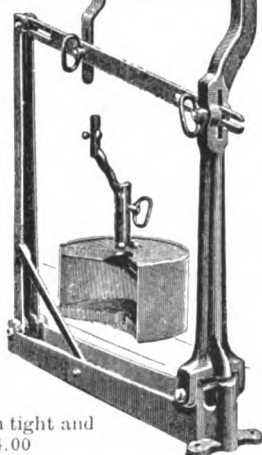
This is a special Belting; is made of very heavy duck. It is flexible, and can be furnished in any length. The ends are usually joined by sewing. We can furnish other sizes to order.

For Emery and Quartz or Flint to use on Belts, see page 274 of this catalogue.

Width.	Per Ft.	Width.	Per Ft.
$1\frac{1}{2}$ inch	\$0.06	4 inch,	\$0.12
2 "	.07	$4\frac{1}{2}$ "	.13
$2\frac{1}{2}$ "	.08	5 "	.14
3 "	.09	6 "	.18
$3\frac{1}{2}$ "	.11		

THE HORNER STRAPPING OR BELT POLISHING LATHE.

The cut, Fig. 929, represents a new Strapping or Belt Polishing Machine, which is an entirely new design in this type of machine, and is especially intended for certain classes of work, not possible to be done satisfactorily on other machines of this kind.



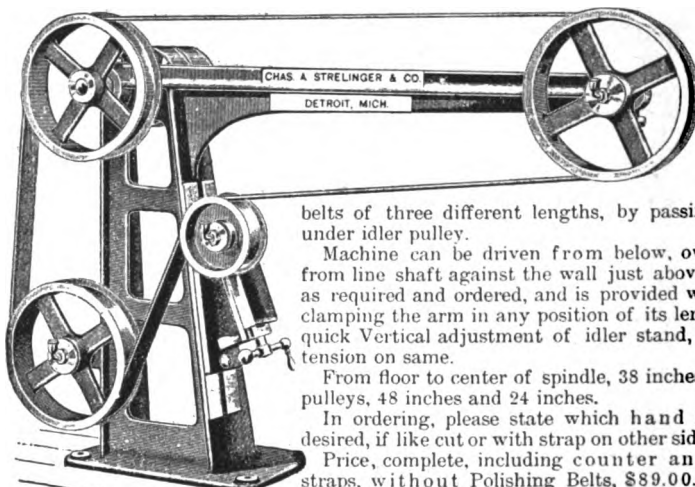


FIG. 929. STRAPPING LATHE.

The flanged pulleys, 12 inch's in diam. $2\frac{1}{2}$ inch face, can be used with

belts of three different lengths, by passing over or under idler pulley.

Machine can be driven from below, overhead, or from line shaft against the wall just above the floor, as required and ordered, and is provided with a rest, clamping the arm in any position of its length. Has quick Vertical adjustment of idler stand, also screw tension on same.

From floor to center of spindle, 38 inches; between pulleys, 48 inches and 24 inches.

In ordering, please state which hand machine is desired, if like cut or with strap on other side of frame.

Price, complete, including counter and rest for straps, without Polishing Belts, \$89.00. Weight, complete, about 350 lbs.

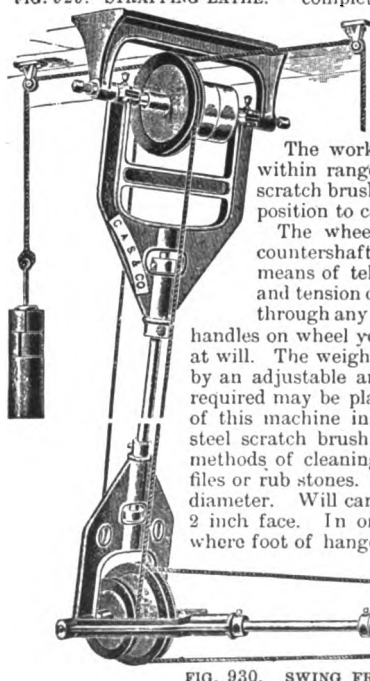


FIG. 930. SWING FRAME GRINDER.

SWING FRAME GRINDER.

This machine is to be suspended from overhead, and is especially designed to meet the requirements of foundries, machine shops and all places where chipping and filing are done on castings and other metals.

The work can be placed on the floor, truck or bench within range of the machine, and the emery wheel, wire scratch brush or polishing wheel can then be swung in any position to conform to the surface of the work.

The wheel or brush being driven from a swinging countershaft, and series of yokes suitably connected by means of telescopic tubes that are adjustable for stretch and tension of belts, and are free to revolve in their sockets through any angle, can be held by the conveniently arranged handles on wheel yoke, and moved back and forth over the work at will. The weight of wheel yoke and wheel is counter-balanced by an adjustable arrangement of weights, so that any pressure required may be placed on the wheel when grinding. By means of this machine in connection with either the emery wheel or steel scratch brush, a great saving can be made over old hand methods of cleaning castings by means of hammer and chisel, files or rub stones. Spindle, shaft and countershaft $1\frac{1}{2}$ inches in diameter. Will carry wheel 16 to 18 inches diameter, and up to 2 inch face. In ordering, give height from floor to ceiling, or where foot of hanger is to be secured.

Price of Machine, complete, with Belts, \$110.00.

GRINDSTONES.

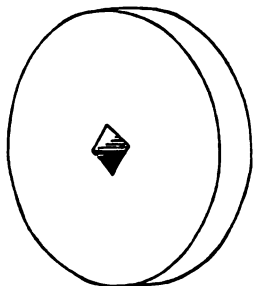


FIG. 931. GRINDSTONE.

can furnish the others to order, as well as the Columbia and Olmsted.

The following list gives sizes in thickness and diameter, which we usually carry in stock; can furnish all sizes up to 8 ft. in diameter, 12 inches thick:

Diam. Inch.	Thickness in Inches.					
	1½	1¾	2	2½	3	4
24	\$0.90	\$1.05	\$1.20	\$1.50	\$1.80	
26	1.00	1.15	1.30	1.65	2.00	
28	...	1.30	1.45	1.85	2.25	
30	...	...	1.85	2.30	2.75	3.20
32	...	...	2.10	2.65	3.15	3.65
36	...	...	...	3.40	4.05	4.75
42	...	...	...	...	5.50	6.45
48	...	...	...	...	7.25	8.50

LATHE GRINDSTONES.

These are small grindstones with round hole, varying in thickness from 1 inch to 1½ inches.

Price, each, 6 inch, 60 cts.; 8 inch, 75 cts.; 10 inch, 85 cts.; 12 inch, \$1.00.

There are a considerable number of Imported Grindstones used, for concaving razors, grinding surgical instruments, optical lenses, etc. We do not keep any of these in stock, but can furnish some of the different brands to order.



FIG. 932. GRINDSTONE FIXTURE.

The Grindstone Fixtures usually sold in hardware stores are light, flimsy affairs. Our Grindstone Fixtures are extra heavy:

well made, and well worth the difference in price.

No. 60,	\$2.00	per set,	36 inches long.
" 62,	1.50	" 28	" "
" 64,	1.15	" 22	" "
" 66,	.85	" 16	" "

FIG. 933.
FAMILY
GRINDSTONE.

Diam. of Stone.	Price.
8 inch.	\$1.15
10 "	1.40
12 "	1.65

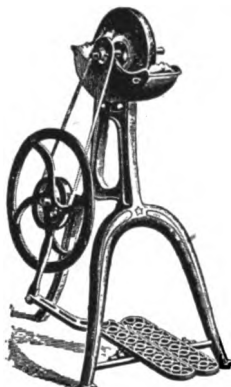
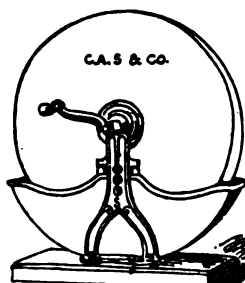
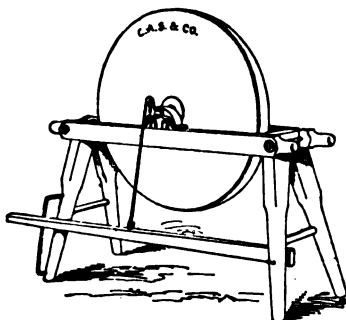


FIG. 934. FOOT POWER GRINDER.

Fig. 934 is a Foot Power Family Grindstone, which will be found very useful for household work, and by mechanics for grinding small tools.

The stone is 9 inches in diameter, 1½ inches thick, and can be run at quite a high rate of speed.

Price, \$4.00.

FIG. 935. MOUNTED GRINDSTONE.
For prices, see next page.

See New Foot Power Grinders on Page 260.

The frames are made of well seasoned hardwood. Every frame is provided with Treadle, Crank and Bucket-holder.

No.	Price.	Weight of Stone.	Thickness.
3	\$2.75	40 to 50 lbs.	1½ to 2½
2	3.25	70 to 80 "	1½ to 2½
1	3.75	100 to 110 "	1½ to 2½

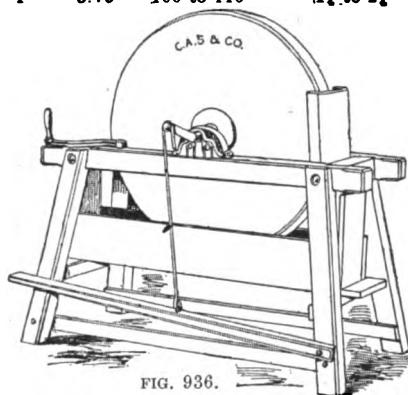


FIG. 936.

HERCULES MOUNTED GRINDSTONE.

The frames are made of seasoned oak, with oiled and varnished finish, strongly braced in all directions. It has an extra heavy shaft and turned rollers; is especially designed for railroad and shop purposes where a strong, heavy article is required.

No.	Price.	Size Stone.	Wgt. Stone.
5	\$6.50	28 x 3 in.	165 lbs.
7	7.50	30 x 3 "	185 "
10	8.50	34 x 3 "	240 "

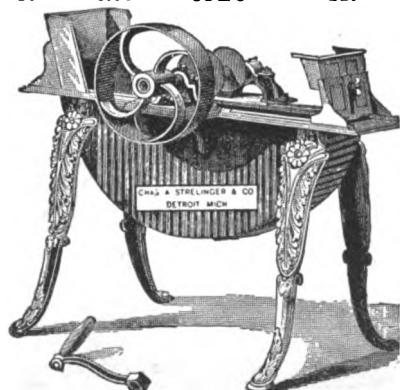


FIG. 937. IRON GRINDSTONE FRAME.

The Iron Grindstone Frame, Fig. 937, is suitable in size to swing a stone 30 inches in diameter and 1½ inches thick.

No. 1, \$13.25, hand or foot power.

No. 2, (see cut) \$16.50, with pulley for power only.

No. 3, \$18.00; this is the same as No. 2, with the addition of treadle for foot power.

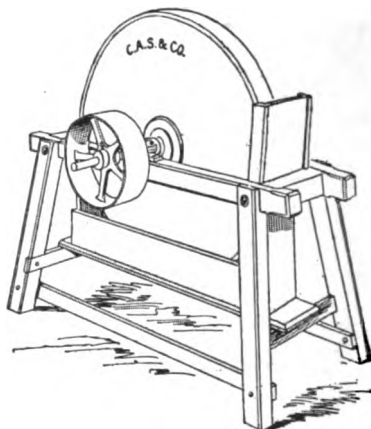


FIG. 938. POWER GRINDSTONE.

These frames are strongly made of seasoned oak, braced securely in every direction and firmly bolted together. The prices include Grindstone and everything complete, as shown in cut.

No. 7,	\$23.00;	size of stone,	36 x 4½ in
" 8,	26.00	" " "	42 x 5 "
" 9,	33.50	" " "	48 x 6 "
" 10,	43.00	" " "	54 x 7 "
" 11,	54.00	" " "	60 x 8 "

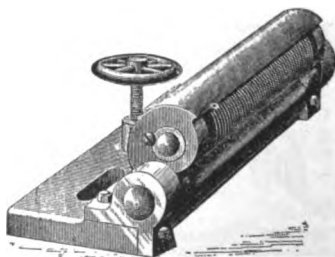


FIG. 939. GRINDSTONE TRUING DEVICE.

One of the most disagreeable things to be done in a workshop is the truing of

Read pages 1 to 4.

grindstones. It is, therefore, often the case that they are allowed to become quite out of shape and untrue, very much to the annoyance of the workman, who finds it almost impossible to grind his tools in a proper manner. The cut, Fig. 939, illustrates a device well adapted for truing and keeping the face of grindstones constantly in good shape. This can be instantly applied to the face of the stone, working automatically, and without dust, keeping the face always in good shape without interfering with its constant use.

Price, with 7 inch roll, \$13.00
 " " 12 " " 17.00

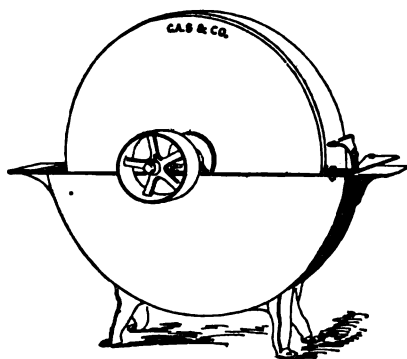


FIG. 940. POWER GRINDSTONE.

The trough is cast in one piece, making it water tight, and avoiding all joints; an adjustable tool rest, with drip pan, is furnished with each frame. The prices are for Frame and Stone complete. We furnish a 12 inch pulley with all sizes. Will substitute any required size pulley, charging only the actual difference in price. Can also furnish Frame with 12 inch loose pulley additional, for \$3.00 extra.

No. 2,	\$33.00,	Stone,	30x5 in.,	shaft,	1½ in.
" 2	36.00	"	38x6	"	1½ "
" 2	38.00	"	40x6	"	1½ "
" 1	42.00	"	46x5	"	1½ "
" 1	48.00	"	48x6	"	1½ "
" 1	58.00	"	50x8	"	1½ "

Intermediate sizes furnished when required.

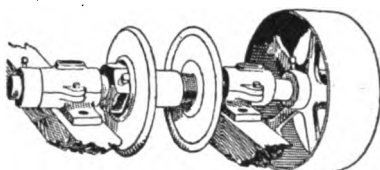


FIG. 941. PATENT GRINDSTONE FIXTURE.

The advantage of this Fixture is the ease with which it is put into the Stone and adjusted, so as to make the Stone run true. These Fixtures are well made and finished. Prices below do not include pulleys; will give prices for pulleys when desired.

No.	Price.	Diam. Shaft, in.	Length, in.	Suitable for Stone.
1	\$16.00	2	30	79 x 10 or less.
2	15.00	1½	30	60 x 8 "
3	12.00	1½	30	48 x 6 "
4	8.50	1½	28	36 x 6 "
5	7.50	1	26	30 x 4 "

WRITE YOUR NAME AND ADDRESS PLAINLY.—A good many men write their names so often that they are very apt to "slur over." We often get letters in which every word is as plain as print, but the signature is written so carelessly that it is impossible for us to read it correctly; the consequence is, that having to guess at it, goods or letters sometimes "turn up missing."

We show copies of a few names carelessly written. These are taken from letters in our possession, and we would be safe in offering a prize of fifty dollars to anyone who could correctly read all of them; but the main drawback is that we could not ourselves tell whether they were right or not.

W. E. Mumma.

W. E. Mumma

E. J. Mumma

OIL STONES.

These stones are termed "Oil Stones" for the reason, that oil must be used to float off the particles of steel cut from the tools, and thus prevent them from filling up the minute pores of the stone.

WASHITA OIL STONE.

Washita Stone is found in the spurs of the Ozark Mountains, of Arkansas, near the Hot Springs. It was first put upon the market nearly 50 years ago, and was named "Ouachita" (since corrupted to Washita). It is composed of nearly pure silica, and its sharpening qualities are due to the small, sharp pointed grains, or crystals, which are hexagonal in shape and harder than steel.

There are various grades of Washita rock. The best whet-stones are very porous and uniform in texture. The poor grades are less porous, making them vitreous, or "glassy," or they may have hard spots or sand holes.

ARKANSAS OIL STONE.

Arkansas Oil Stone is the best sharpening stone known, for engravers, watch-makers, surgeons, and others who use very fine edge tools. It is expensive to manufacture, being nearly sixteen times as hard as common marble. A good Arkansas Stone will, with careful use, last almost a lifetime.

SOFT ARKANSAS OIL STONE.

This is a grade between the regular Arkansas and the Washita stone; is especially adapted for sharpening the tools of wood carvers, pattern makers and workers in hard wood; has been on the market only a few years, and has met with a constantly increasing sale.

We mean to send out nothing but the finest grades of Oil Stones. Every stone is selected and warranted to be free from flaws, grit and hard spots.

RED LABEL WASHITA STONES.

No.	Price.	Length, in.	Width, in.	Thickness
1	\$0.80	8	2	1
2	.90	8	2	1½
3	1.00	8	2	1½
4	1.15	8	2	1½

RED LABEL SOFT ARKANSAS OIL STONES.

These Stones are the same dimensions as the Washita. Prices are as follows: No. 1, \$2.00; No. 2, \$2.25; No. 3, \$2.50; No. 4, \$2.85.



FIG. 942 MOUNTED OIL STONES.

In polished cherry-wood boxes.

Size Stone	Washita	Arkansas.
3½ x 2	\$0.45	\$0.75
6 x 2	.75	2.25
8 x 2	1 00	3.00

ARKANSAS OIL STONE.

Arkansas Oil Stones are very difficult to obtain in any regular sizes. They range in prices from \$1.50 to \$3.00 per pound, according to quality and size. If customers will inform us in regard to about the size wanted, we will name price and state nearest sizes we have in stock.



FIG. 943. ROUND EDGE SLIPS.

The Round Edge Slips come in lengths from 3 to 5 inches; width from 1½ to 2 inches; thickness on back, ½ to ¾ inch; thickness on edge, from ¼ to ½.

We class them in two sizes, heavy and light. For example, in the light Slips, the thickness at back would be from ½ to ¾; thickness at edge, ¼ to ½; in the heavy Slips, from ¾ to 1 at back, and ½ to ¾ inch at the edge.

	Washita.	Soft Arkan's	Arkansas.
L'gth	Light H'vy	Light H'vy.	Light H'vy.
3 in.	\$0.15	\$0.20	\$0.35 \$0.50 \$0.60 \$0.75
4 "	.20	.25	.45 .55 .70 .90
5 "	.23	.30	.55 .65 .85 1.00

We also sell these by the pound, and will name prices upon application.



FIG. 944. KNIFE BLADE SLIPS.

Three to four inches long, ½ to 1 inch wide, ½ to ¾ on back, Arkansas, each. 50 cents.



FIG. 945. PEN KNIFE PIECES.

Pen knife pieces from $2\frac{1}{4}$ to 4 inches long, 1 to $1\frac{1}{2}$ inches wide, and $\frac{1}{4}$ to $\frac{1}{2}$ inch thick. Washita, from 15 cts. to 25 cts. each; Arkansas, from 35 cts. to 65 cts. each.



FIG. 946. TRIANGULAR.

Three to four inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch on face. Arkansas, each, 50 cents.

SQUARE.

Three to four and one-half inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch square. Arkansas, each, 50 cts.

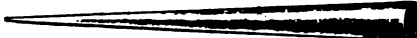


FIG. 947. PENCIL POINTS.

From $2\frac{1}{4}$ to 4 inches long. Arkansas, each, 40 cents.

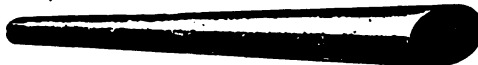


FIG. 948. GOUGE SLIPS.

These are oval in shape, about $\frac{1}{4}$ inch on large end, tapering to $\frac{1}{8}$ inch at small end. Washita, each, 45 cts.; Arkansas, each, \$1.00.



FIG. 949. WHEEL.

From $1\frac{1}{4}$ to 4 inches diam., $\frac{1}{4}$ to $\frac{1}{2}$ inch thick, $\frac{1}{4}$ to $\frac{1}{2}$ inch hole. Per inch diam., Washita, 80 cents.; Arkansas, \$2.40.



FIG. 950. ARKANSAS CARVING TOOL SLIPS.

These are about $3\frac{1}{4}$ inches long. Price, per set of 4, \$1.00; each, 30 cts.; postage, 5 cts.

EMERY AND CORUNDUM STONES.

Although Emery Stones have been made (in a limited way) for many years, it is but a short time since the larger Emery manufacturers have taken them up; they were formerly made of coarser grades of Emery, used only for rough work, and either dry or with water.

They are now being made in a great variety of shapes and sizes, and can be used with oil the same as an ordinary oil stone.

There is one advantage in these over the oil stone, and that is, their uniformity, there being no hard or soft spots. We list them in three grades: Coarse, Medium and Fine, designated in the list below by the letters C, M and F.



FIG. 951. ROUND. FIG. 952. TRIANGULAR.



FIG. 953. SQUARE. FIG. 954. SLIP.

The Coarse is about equal to a fine Sand stone, the Medium to a Lake Superior or Seneca Oil Stone, and the Fine is about the same as a fast-cutting Washita.

We often sell them in pairs, one for roughing out and the other for finishing. We can furnish them in other shapes and sizes, and can also furnish Coarse Emery Bricks in any size, for rubbing castings and other rough work.

ROUND, SQUARE AND TRIANGULAR.

Lgh.	Diam.	C and M.		F.	
in.	in.	Each.	Doz.	Each.	Doz.
2	$\frac{1}{4}$	\$0.15	\$1.50	\$0.20	\$2.00
3	$\frac{3}{8}$	.15	1.50	.20	2.00
4	$\frac{1}{2}$	.18	1.75	.25	2.25
4	$\frac{3}{4}$	.25	2.25	.30	2.75

Square Sticks are only made in the four inch lengths.

SLIP STONES, FIG. 954.

All Slip Stones are 4 inches in length.

Wdh.	Thick'n.	C and M.		F.	
in.	Edge. Back.	Each.	Doz.	Each.	Doz.
$1\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	\$0.25 \$2.25	\$0.30	\$2.75
$1\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	.30 2.75	.35	3.25
$2\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	.30 3.00	.35	5.50

FIG. 955.
FLAT OR
BENCH
STONES.

Lgh.	Wdh.	Thick.	C and M.		F.	
in.	in.	in.	Each.	Doz.	Each.	Doz.
$3\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	\$0.15	\$1.50	\$0.20	\$2.00
$3\frac{1}{2}$	$1\frac{1}{4}$	$\frac{1}{4}$	.20	2.00	.30	3.00
4	$1\frac{1}{4}$	$\frac{1}{4}$	.25	2.50	.40	3.75
6	$1\frac{1}{4}$	$\frac{1}{4}$	.35	3.50	.50	5.00
8	2	1	.45	4.50	.60	6.00

GROUND EMERY.*



FIG. 956.

We usually carry in stock all numbers of Emery from 14 to FF (fine flour).

Upon receipt of 10 cents (which is less than cost of putting up and postage) we will send to any address a wooden case, containing 6 bottles of Emery of assorted grades, such as are most commonly used, or as customer may desire.

In this connection, we give a comparative list of the numbers of Emery as used on Emery Paper and Cloth, and these same numbers are used to express the different grades of Sand Paper.

Nos. on Paper and Cloth.	No. of Flour	Nos. on Paper and Cloth.	No. of Emery.
00	Flour	1½	70
0	120	2	60
½	90	2½	54
1	80	3	46

Best Turkish Emery, small lots, 10 cts. lb.; in lots of 10 to 50 lbs., 7 cts. lb.

We will be pleased to name special prices in large quantities. Emery comes from the mill in kegs containing from 300 to 350 lbs., and in ½ kegs, containing from 150 to 175 lbs. In shipping, we generally use Stark grain bags, for all quantities from 50 to 150 lbs., for which we charge market price, about 15 cents. The bag is useful for any other purpose.

CORUNDUM.

We usually carry in stock all numbers of Corundum from 14 to 160. Price, in small lots, 15 cts. per lb. Will be pleased to name special prices on larger lots.

GROUND QUARTZ.

Ground Quartz, or Flint, is the material used on ordinary Sand or Flint Paper; and is also used largely on Sand Belts and Wheels by manufacturers of handles, spokes and all kinds of woodenware. The grades correspond with the numbers used on sand paper, No. 3 being the coarsest.

Ground Quartz, small lots, 4 cts. lb.; in lots of 10 to 100 lbs., 3 cts. lb. Special prices named in large quantities. We ship this in Stark grain bags, for which we charge market price, which is about 15 cents.

SAND PAPER AND EMERY CLOTH.

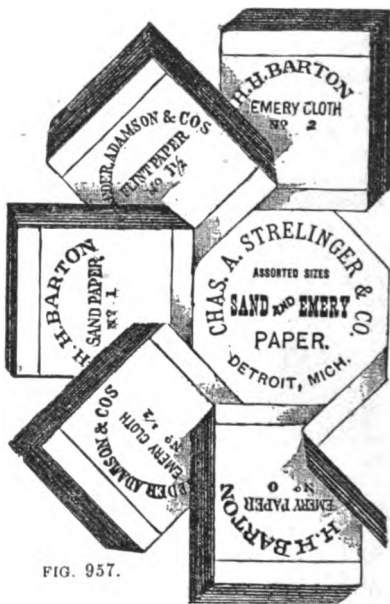


FIG. 957.

We handle the best quality of Sand and Flint Paper, and usually keep in stock the H. H. Barton and Baeder, Adamson & Co. brands.

No.	00	0	½	1
Per Ream,	\$2.70	\$2.70	\$2.70	\$2.70
Per Quire,	.17	.17	.17	.17
Per Dozen,	.10	.10	.10	.10
No.	1½	2	2½	3
Per Ream,	\$2.70	\$3.00	\$3.00	\$3.00
Per Quire,	.17	.20	.20	.20
Per Dozen,	.10	.12	.12	.12

*See article on Emery and Corundum, page 245.

SAND PAPER IN ROLLS.

We carry a large line of Sand Paper in 50 yard rolls, 23 $\frac{1}{2}$, 30, 36 and 40 inches in width, but do not sell less than full rolls.

Nos.	0 to 1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3
23 $\frac{1}{2}$ in.	\$3.00	\$3.30	\$3.60	\$3.90
30 "	4.80	5.40	6.00	6.60
36 "	6.00	6.60	7.20	7.80
40 "	7.20	7.80	8.40	9.00

EMERY CLOTH.

Nos.	00 & 0	$\frac{1}{2}$ to 1 $\frac{1}{2}$
Per Ream,	\$10.80	\$10.80
Per Quire,	.65	.65
Per Dozen,	.40	.40
Per Sheet,	.04	.04

Nos.	2	2 $\frac{1}{2}$	3
Per Ream,	\$12.00	\$14.40	\$15.60
Per Quire,	.75	.85	.95
Per Dozen,	.45	.50	.60
Per Sheet,	.05	.05	.06

We also have the Crocus Cloth, finer than any of the above. Prices the same as Nos. 00 to 1 $\frac{1}{2}$.

EMERY PAPER.

Nos.	00 to 1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3
Per Ream,	\$3.90	\$4.50	\$5.70	\$6.90
Per Quire,	.25	.30	.35	.40
Per Dozen,	.15	.18	.20	.25

FRENCH EMERY PAPER.

This is an extra fine quality paper, and is used extensively for all fine polishing work. An idea of the comparative fineness may be gained from the fact, that the No. 00 regular Emery paper is about equal to the French No. 0.

Nos.	0 and 00	000 & 0000, finest
Per 100 sheets,	\$1.75	\$2.25
Per Dozen,	.25	.30
Per Sheet,	.03	.03

BARTON'S GARNET PAPER.

There are perhaps six or eight different concerns who make the so-called "Garnet" and "Ruby" papers. We believe the original makers of the Garnet paper were H. H. Barton & Son, and of the Ruby paper, Herman Behr & Co.

The Behr Ruby Paper is considered especially desirable on shoe work.

Garnet paper is considerably higher in price than Sand, or Flint Paper, but it is claimed will do from two to three times as much work, and judging from the fact that the leading wood-working establishments in the country buy it in large quantities, and the demand is



FIG. 958.

constantly increasing, we are inclined to believe the claims made for it are well substantiated. In this connection, it would be well to bear in mind that the cost in time—which means money—of changing, or renewing, the paper on Sanding Machines is apt to be more than the cost of the paper itself; and that a large portion of this expense is saved in using a paper that will do twice the work.

GARNET POLISHING PAPER.

The Garnet Finishing, or Polishing Paper, is made of thin, fine stock paper. It can be twisted and used almost like a handkerchief; is used by furniture makers and others for fine finishing work; and also by pattern makers for getting in sharp corners. For this purpose it will do double the work in less time than Sand Paper. We usually keep this in three different grades, all fine, from No. 1 to 0000. Price, per ream, \$3.50; price per quire, 25 cents.



FIG. 959. GARNET PAPER IN ROLLS.

Nos.	0 to 1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3
23 $\frac{1}{2}$ in.	\$4.80	\$5.20	\$5.80	\$6.60
30 "	7.20	8.00	8.80	9.60
36 "	8.80	9.60	10.40	11.20
40 "	10.40	11.20	12.00	12.80

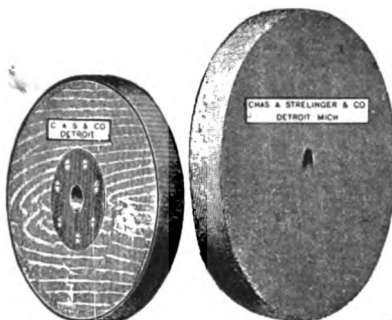


FIG. 960.

FIG. 961.

LEATHER COVERED AND SOLID LEATHER POLISHING WHEELS.

PRICE LIST OF FIG. 960.

Diam.	Thickness, inches.				
	1	1½	2	2½	3
8 in.	\$1.00	\$2.15	\$2.40		
10 "	2.40	2.65	2.75	\$3.90	\$3.60
12 "	2.55	2.75	3.00	3.40	3.85
14 "	3.00	3.20	3.40	3.85	4.25
16 "	3.40	3.60	3.85	4.25	4.65
20 "	4.25	4.45	4.65	5.35	5.75

Intermediate and larger sizes furnished when desired.

A tool running at such a rate of speed as these wheels require, should be made in the best possible manner, and long experience of the makers, guarantees the excellent quality of the wheels. Only the very best selected thin pine is used. It is well dried, and when planed and glued together each piece has its grain at right angles to those on either side. In gluing up, both wood and glue are made hot, and put into a heavy hydraulic press, kept there until cold, and then dowel pins driven in. The covering is a selected heavy oak-tanned leather, unless some special covering is ordered.

SOLID LEATHER POLISHING WHEELS.

The material used in the manufacture of these wheels is prepared in such a manner as to closely resemble the finest walrus or sea-horse leather, over which it has many advantages—among others, an economy of 50 per cent. at the present time, and as walrus and sea-horse get scarcer every year, this percentage will be materially increased.

They have advantages over other wheels, being pliable and elastic; can be

turned to any shaped face; will save the continual expense of recovering, as a coat of emery is all that is required to make them ready for service.

They will wear for years, and, while the first cost may be higher than many wheels, they are cheaper in the end, as an application of emery lasts longer, more work can be done in a given time and with less fatigue to the workman.

Being waterproof, they can be washed when new emery is needed, without injury to the wheel.

They have given general satisfaction on stoves, cutlery, plows, edge tools, saddlery, hardware, nickel goods, jewelry, pearl, etc.

PRICE LIST OF FIG. 961.

Diam.	Thickness, inches.				
	½	¾	1	1½	1¾
8 in.	\$0.35	\$0.45	\$0.70	\$0.90	\$1.15
4 "	.45	.55	.75	1.10	1.40
6 "	.60	.75	1.10	1.50	1.90
8 "		1.00	1.50	2.00	2.50
10 "		1.40	2.05	2.75	3.45
12 "			2.80	3.75	4.70
14 "				5.00	6.25
16 "					7.80

Diam.	Thickness, inches.			
	1½	2	2½	3
6 inches.	\$2.65	\$3.00	\$3.75	\$4.50
8 "	3.50	4.00	5.00	6.00
10 "	4.80	5.50	6.40	8.25
12 "	6.55	7.50	8.90	10.25
14 "	8.75	10.00	12.50	15.00
16 "	10.95	12.50	15.65	18.75

Intermediate and larger sizes furnished when desired.

PAPER WHEELS.

Paper wheels, with emery or corundum applied to face, are often recommended for roughing or hard cutting. They can be used with leather covering, same as wood wheel, and can be turned to any shaped face. List of sizes and prices upon application.



FIG. 962.

FELT
POLISHING
WHEEL.

There is oftentimes a considerable difference in the wearing qualities of different makes of Felt Wheels. The wheels we sell are made by Tingue, House & Co., who make we believe, the best goods of this class on the market.

French Felt Wheels (gray), per pound, \$2.00; Spanish Felt Wheels (white), per pound, \$2.50.

Size.	Weight about	Size.	Weight about
9 x $\frac{1}{4}$	1 $\frac{1}{2}$ lbs.	12 x 1	2 $\frac{1}{2}$ lbs.
9 x 1	1 $\frac{1}{2}$ "	12 x 1 $\frac{1}{2}$	2 $\frac{3}{4}$ "
9 x 1 $\frac{1}{2}$	1 $\frac{1}{2}$ "	12 x 2	3 $\frac{1}{2}$ "
9 x 2	2 "	12 x 2 $\frac{1}{2}$	4 $\frac{1}{2}$ "
9 x 2 $\frac{1}{2}$	2 $\frac{1}{2}$ "	12 x 3	5 $\frac{1}{2}$ "
10 x 1 $\frac{1}{2}$	2 "	15 x 2	7 $\frac{1}{2}$ "
10 x 2	2 $\frac{1}{2}$ "	15 x 2 $\frac{1}{2}$	8 $\frac{1}{2}$ "

We can furnish Sheet Felt of all qualities, and in any desired size.

to stand the hardest work. They are unsurpassed for cutting down work, and for nickel platers' requirements. They are sewed spirally from the center to the edge, and we think will outwear any other sewed Buff on the market.

Canton Flannel Buffs are used mainly for silver and gold plating work.

We can furnish the regular Unbleached or Bleached Cotton Buffs, sewed or stitched, as shown in Fig. 964, at an extra cost of from one to two cents per section, according to size of Buff.

PRICE LIST OF COTTON BUFFS

Diam.	Unbleached. Per Section	Bleached. Per Section	Champion
6 inch.	7 cents.	8 cents.	8 cents.
9 "	12 "	14 "	14 "
12 "	20 "	24 "	24 "
14 "	25 "	30 "	30 "

Larger and intermediate sizes furnished when desired.

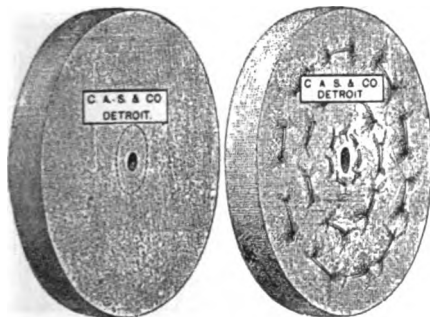


FIG. 963.
COTTON BUFF.

FIG. 964.
STITCHED BUFF.

These Buffs, Figs. 963 and 964, are also known under the trade name of Muslin Buffs. Our Buffs are all made of standard heavy muslin, of close and firm texture. The unbleached Buffs are adapted for general buffing on all kinds of metals, plates, horn, rubber, etc.

Each section is composed of 18 layers, sewed with one row of stitching around the arbor hole, as shown in Fig. 963, and a section is about $\frac{1}{4}$ inch in thickness.

The bleached Buffs are constructed and sewed in the same manner as the unbleached, and are suitable for harder work. They are best adapted to finishing brass, and buffing nickel plated work.

The "Champion" Buffs (not illustrated) are made of bleached stock, and are especially constructed and sewed (or quilted)

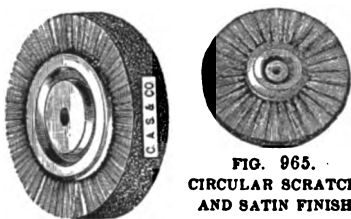


FIG. 965.
CIRCULAR SCRATCH
AND SATIN FINISH
BRUSHES.

These are made of brass and steel wires, from 39 B. & S. gauge and coarser; centers filled with lead.

Diam In.	3 Row. Doz. Each.	4 Row. Doz. Each.	5 Row. Doz. Each.
3	\$5.10 \$0.50	\$6.80 \$0.70	
3 $\frac{1}{2}$	7.65 .75	10.20 1.00	
4	10.20 1.00	13.60 1.35	\$17.85 1.75
5	14.00 1.40	20.40 2.05	\$27.20 2.70
6	18.25 1.80	25.50 -2.55	33.15 3.25
7	23.00 2.30	34.00 3.40	40.80 4.00
8	28.00 2.80	40.80 4.10	51.00 5.00



FIG. 966. BENT HANDLE BRISTLE BRUSH.

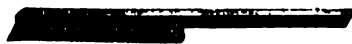


FIG. 967. WIRE SCRATCH BRUSH.



FIG. 968. COTTON POTASH BRUSH.

PLATERS' HAND BRUSHES.

These Brushes are made in great variety of sizes and styles. We print here only those we sell most generally.

Fig. 966 is a curved handle Brush, made up with the best quality of bristles. Four rows, per dozen, \$4.00; each, 40 cts.

Fig. 967 is a Wire Scratch Brush, made with either brass or steel wire. Four rows, per dozen, \$6.00; each, 60 cents.

Fig. 968 is a Cotton Potash Brush with straight handle. Three rows, per dozen, \$2.00; each, 20 cents.

Other sizes, styles and shapes furnished when desired.



FIG. 969. CROCUS COMPOSITION.

Crocus Composition is used for the rougher grades of polishing, very largely on iron work. It is made in several grades, but we handle only the finest quality. Price, in small lots, 6 cents per lb. Special prices on larger quantities.

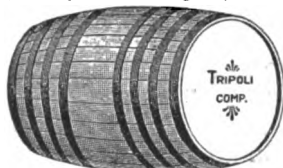


FIG. 970. TRIPOLI COMPOSITION.

This is used for cutting down and polishing brass work. It is a white composition and comes in oblong bricks, weighing about a pound.

Price, in small lots, 8 cents per lb. Special prices on larger quantities

NICKEL ROUGE.

Nickel Rouge is used for finishing brass and nickel-plated work. Comes in oval cakes, weighing about one lb. each.

Price, in small lots, 15 cts. per lb.

FIG. 971. VIENNA LIME.

Vienna Lime is mixed with melted tallow and a little paraffine, to harden it. It is run into shallow tins, and when cold, broken up in small squares, and used in place of red composition.



FIG. 971.

It is used by the leading stove houses and others for polishing matted work, and has none of the objectionable features of the cheaper Crocus compositions, which are difficult to remove entirely from the work after polishing.

This comes in the powdered form, in 25 and 40 lb. air-tight tin cans.

Price, per lb., 8 cts.; in 1 lb. bottles, 25 cts.

FIG. 972. XXX LYE.

This Alkali has very largely replaced the ordinary potash and other caustics for cleaning work from grease. Ordinary potash varies in strength and is objectionable to handle.

The XXX Lye is in small white crystals, dissolves instantly into a clear solution, and is used about 2 oz. to the gallon, instead of 6 to 8 oz., as with other lyes.

In 10 lb. cans, per lb., 12 cts.; in 50 lb. cans, per lb., 11 cts. Special prices on larger quantities.



FIG. 972.

FIG. 973. CYANIDE OF POTASSIUM.



FIG. 973.

We carry in stock both the Chemically Pure and the Fused Cyanide. We sell more of the latter; can furnish in 10 and 25 lb. tins and 1 lb. bottles.

The C. P. grade we have in 50 and 100 lb. tins only. Prices upon application.

NICKEL SALTS.

Our Nickel Salts we believe to be as pure and strong as any in the market. A great deal of the Nickel

Salts ordinarily furnished are of inferior quality, although low in price.

Best quality Nickel Salts per lb., 20 cts.

NICKEL ANODES.

We aim to sell only the best quality, such as will give a pure white deposit, wear away evenly, and maintain a solu-

tion in good condition, without the constant addition of salts. The following sizes, of which the approximate weights are given, are usually carried in stock, and other sizes cast to order on short notice.

2 x 4 x $\frac{1}{8}$ inch thick, 8 oz.	
2 $\frac{1}{2}$ x 8 x $\frac{1}{8}$ " " 2 $\frac{1}{2}$ lbs.	
4 x 7 x $\frac{1}{8}$ " " 1 $\frac{1}{2}$ "	
4 x 7 x $\frac{1}{8}$ " " 2 $\frac{1}{2}$ "	
5 x 8 x $\frac{1}{8}$ " " 4 $\frac{1}{2}$ "	
6 x 12 x $\frac{1}{8}$ " " 8 $\frac{1}{2}$ "	
8 x 12 x $\frac{1}{8}$ " " 14 "	

The price of the Nickel Anodes fluctuates with the Nickel market, and we will name prices upon application.

LACQUERS.

Lacquers are used for protecting the surface of metals of all kinds with a transparent enamel that will resist the atmospheric and other influences, we will be pleased to name prices on quantities.

White Lacquer can be used with a

brush, or as a Dip. We put this up in pint and half-pint bottles for convenient shop use. Price, large bottles, 75 cents; small bottles, 45 cents.

Kristaline Lacquer is the finest Lacquer we know of; will resist acids, alcohol, oil, etc. Price, one pint bottles, \$1.10, half-pint bottles, 65 cents.



This is an improved Bunsen Cell of great power, for electroplating, electric motors, etc. There are nearly ten thousand of these in use, and they are the best Batteries for plating where the absence of power prevents the use of Dynamo Machine. Price, complete, \$5.00.

FIG. 974. H. & V. W. BATTERY.

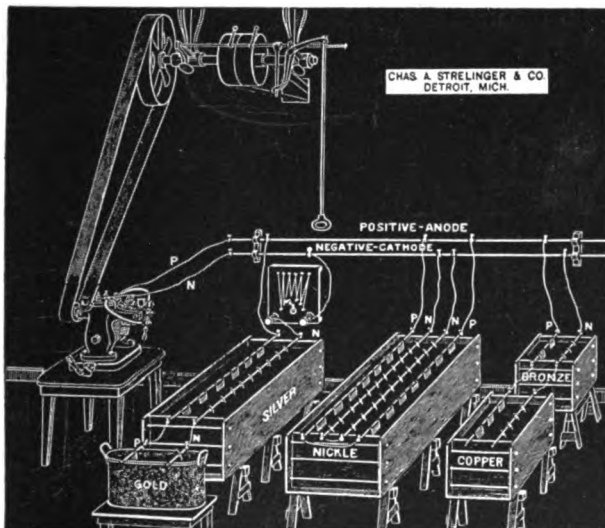


FIG. 975. SHOWING ARRANGEMENT OF PLATING ROOM.

For some time past there has been an increased demand for Plating Outfits, and we show here a very complete line.

Electroplating is an art acquired only after careful experiment. To become thoroughly expert takes time, but with

care and a little experiment, most of the common processes are understood and successfully accomplished. When once understood, plating is quite profitable.

We furnish with each outfit special instructions, but would advise any one in

tending to take up this work, to procure any of the excellent works published on Electro-Metallurgy.

Outfit No. 30, \$5.00:

This Outfit includes one No. 2 H. & V. W. Battery, one-half gallon Silver Solution, one Silver Anode, one Glass Jar for bath, connecting Rods and Wire, Hanging Wire, Brush, Soft Rouge and Pumice Stone.

Outfit No. 35, \$10.00:

Same as the above except there is furnished one and one-half gallons of Silver Solution and a box of Tripoli.

Outfit No. 40, \$18.00:

This Outfit includes two No. 2 H. & V. W. Batteries two gallons Silver Solution, one Silver Anode, one Glass Jar for Silver Bath, one pint Gold Solution, one Gold Anode, connecting Rods and Wire, Copper Hanging Wire, one each, cleaning and scratch brush, steel burnisher, one box Rouge. Tripoli, Pumice Stone and Whiting.

Outfit No. 45, \$30.00:

This Outfit has a No. 1 H. & V. W. Battery, 4 gallons Silver Solution, Porcelain lined tank for Silver Bath 17 x 8 x 8, one Glass Jar for Gold Bath, and one copy of Watt's Electro-Metallurgy, besides the other different articles mentioned in Outfit No. 40.

NICKEL-PLATING OUTFITS.

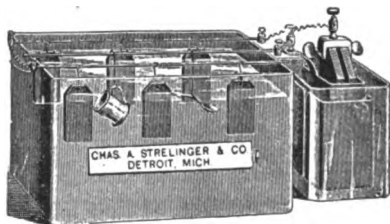


FIG. 976.

Outfit No. 9, \$20.00—4 gallons:

With this Outfit is included one Battery, Porcelain-lined tank 17 x 8 x 8, 4 gallons Nickel Solution, Nickel Anodes, 4 rods and 6 connections, one Hydrometer, copper wire for connecting and slinging, bottle Cyanide Potash, Pumice Stone, Vienna Lime, can XXX Lye, one Muslin Buff, Crocus and Emery Composition, 3 scouring brushes, Potash brush, and a copy of Watt's Electro-Metallurgy.

Outfit No. 10, \$30.00—10 gallons:

With this Outfit we furnish a ten-gallon wood tank 24 x 10 x 12, perfectly lined and tight, 10 gallons Nickel Solution, and, in addition to the articles given in Outfit No. 9, one can of Cleaning Compound, Tripoli Composition, Nickel Rouge, and a can of Lacquer.

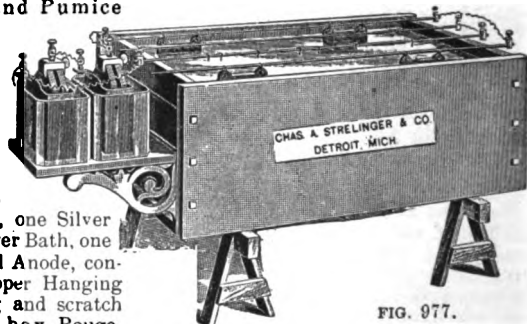


FIG. 977.

Outfit No. 11, \$45.00—20 gallons:

This Outfit is the same as No. 10, excepting that we furnish a 20 gallon wood tank, 2 Batteries, and 20 gallons of Nickel Solution.

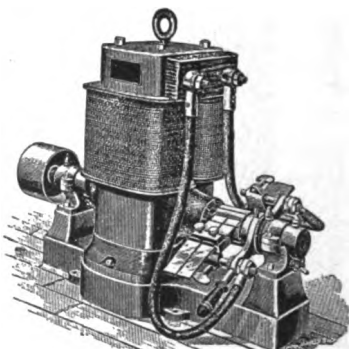


FIG. 978. KING DYNAMO.

Above we present a cut of the latest improved King Dynamo, for Electro-Plating and Electrotyping. We believe that this is the best machine of its class on the market. A number of our customers who have used the Eddy and other high class machines, give this preference, and state that, in their judgment, this machine is far ahead of any other.

The King Dynamo has many points of advantage, which are of great importance. There is no reversing of current, thereby spoiling entire batches of work; no sparking on the commutator when the brushes are properly adjusted, and no detrimental heating of fields or armature.

It is the only Electro-Plating and Electrotyping Dynamo that we know of that generates and holds a perfectly steady voltage, or tension, whether running with a light load or loaded to its full capacity. This machine generates a powerful, steady, low-tension current, thereby producing a fine quality and not buring the work, depositing the metal more quickly and smoother than any other machine on the market. The metal put on by this system is not so hard to buff, and makes a more lasting deposit besides buffing up with a fine rich color.

For electrotyping, we gauge the capabilities of the above machines, by the number of square feet of copper they are desired to deposit; they deposit a good shell in two hours.

No. 0, \$125.00, for 300 gal. Nickel Solution-

" 1	200.00	" 600	"	"	"
" 2	300.00	" 1000	"	"	"
" 3	400.00	" 1700	"	"	"

We expect to have ready for the market before long, a size smaller Dynamo than the No. 0, suitable for 100 to 150 gallons of Nickel Solution. Prices and dimensions upon application.

DYNAMOS AND MOTORS.

We are also prepared to furnish Dynamos for Arc and Incandescent lighting, and Electric Motors, from $\frac{1}{4}$ H. P. upwards. Circulars and prices will be furnished to those interested.

For small Dynamos and Motors, and parts of same, see index.

POLISHING.

In these days of Finished and Nickel-Plated goods, the trade of polishing has grown to be a very important one; and there are many processes, every polisher having some "notions" that he thinks are better than the "other fellow's."

We present here a few illustrations of Polished work, with brief descriptions of how it is commonly done.

In Polishing Pliers, shown on page 58, first a leather wheel with No. 80 Emery is used for a rough finish; then the same

kind of wheel, with No. 120 Emery for finer finish; after this the grease wheel is used. This is the same wheel as last named, after the sharpness of the emery has been taken off by use, and oil put on (tallow preferred). This leaves a nice finish. If a very fine finish is desired, or the pliers are to be nickel-plated, a felt or leather wheel, with flour of emery, is used. After nickeling, use Cotton Buff with Nickel Rouge.

Sheet brass work, such as the oilers, shown on page 293, and similar goods, is usually done with Cotton Buff Wheels, using Tripoli Composition to "cut down" and Nickel Rouge as a finishing polish. Cast brass work, such as the hexagon and square parts on lubricators, oil cups, valves, etc., is usually finished on a felt or leather covered wheel. These wheels must be perfectly flat and run true, so as not to take off the sharp corners. The round parts being finished with Cotton Buffs, with Tripoli and Nickel Rouge.



FIG. 979.

For raised work, such as shown in above cut, if iron, use leather-covered wheels, with No. 80 emery, then the same with No. 100 emery; finish with oil wheel (flour of emery, oil or tallow). It is then plated and finished with felt wheel, and Tripoli Composition or Nickel Rouge, as may be preferred. If castings are good and fine, and a high finish is not required for the back ground, all that need be done is to thoroughly scour with pumice stone and water.

If the article is of brass, use finer grades of emery, and substitute felt wheel with tripoli for oil wheel; after plating, polish with Cotton Buffs and Nickel Rouge.

Bicycle parts, bit braces, and a great variety of both small and large work, can be done to the best advantage only by using the Strapping Lathe with Emery Belts.

Solid emery wheels are used for taking off the gates and fins from the rough castings.

PLUMB BOBS.

Until quite recently, the only Plumb Bobs that were offered for sale were the common cast iron and lead, and perhaps two sizes of cast brass, all very indifferently made as regards finish or accuracy. Within the past few years, however, there has been quite an "epidemic" of new makes—many of them good. We have selected, out of the different kinds we have handled, those which we consider superior.



FIG. 980.

No. 5, \$0.45, 6 oz.; No. 6, \$0.65, 11½ oz.

LAMP PLUMB BOB.

The Lamp Plumb Bob, Fig. 981, priced below, was originally made in two or three sizes, especially for millwright's use, and to the best of our knowledge, was the first good Plumb Bob made for general sale; manufactured of the best cast bronze,



FIG. 981.

has long steel point fitted in tapering hole through the body, and held by a cap, as shown.

These Bobs are furnished in quite a variety of sizes, to suit all tastes and purposes.

No.	Each.	Weight	Diam.
00	\$1.50	10 oz.	1½
0	1.50	1 lb.	1½
½	2.00	1 "	8 "
1	2.50	2 "	2½
2	2.75	2 "	2½
3	3.00	2 "	10 "
4	3.25	3 "	2 "
5	3.50	3 "	8 "
6	4.00	4 "	4 "

MERCURY PLUMB BOBS.



The Mercury Plumb Bobs, Fig. 982, are made by the Brown & Sharpe Mfg. Co., Providence, R. I. These are made of solid steel rod, bored out and filled with mercury. They are unusually heavy in proportion to their size, and the center of gravity is low. The points are hardened, and the bodies and points are ground.

These instruments are nickel-plated, and each is furnished with a braided silk line.

The shape and comparatively small diameter render them more convenient than the ordinary plumb bobs.

982. bobs.

3½ oz.	\$0.90	4 in. long;	½ in. diam.
6 "	1.35	4½ "	½ "
12 "	1.80	5½ "	½ "
16 "	2.25	6 "	1 "

LINES AND CORD.

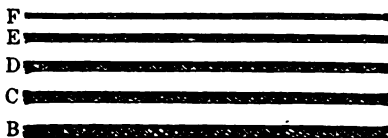


FIG. 983.

The most difficult feature in describing lines is to give an adequate idea of the different diameters or thicknesses. The material being yielding it is next to impossible to measure them. In the above cut we attempt to give an idea of the various sizes, but the cut is only approximately correct.

BRAIDED SILK AND LINEN LINES.

Our Braided Silk Lines are made of pure silk; they cost about one-half more than the "raw" silk and are well worth the difference. They come 25 yards on a board; can furnish 100 yards in one piece. The Linen Lines also are the best quality.

Size,	B	C	D	E	F
Silk, 25 yds,	\$0.90	.75	.60	.50	.40 cts.
Linen, "	.30	.30	.25	.25	.20 "

Price on Silk and Linen Lines include postage.

BRAIDED LINEN LINES.

We also carry in stock Hard Braided Linen Lines, in coils of 50 yards, these are slightly heavier than the regular lines. We can furnish, if required, 1,000 feet in one continuous length. Price, per coil, all sizes, 60 cts.

CHINA, OR "SEA GRASS" LINES.

The Sea Grass Lines are very much liked by engineers and machinists. We have them in two sizes, Nos. 1 and 3; No. 3 being equal in size to the "E" line on opposite page. These come in bunches of $\frac{1}{2}$ Doz. hanks; the No. 1 hank containing 32 feet, and No. 3, 18 feet. Price, per $\frac{1}{2}$ doz. hanks, 50 cts.; per doz. hanks, 80 cts.

COTTON MASONS' LINES.

The Mason's Line is a twisted line, and comes in 100 feet hanks. We have two sizes Nos. 6 and 8; the No. 6 is about $\frac{1}{4}$ inch in diameter and the No. 8 about $\frac{3}{8}$ inch. No. 6, per hank, 20 cts., per doz., \$2.00
" 8, " " 30 " " " 3.00

BRAIDED CORD AND ROPE.

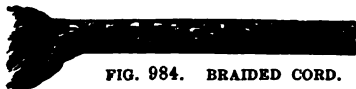


FIG. 984. BRAIDED CORD.

The Braided Cord we carry both in Cotton and Linen, the Linen Cord being used where greatest strength and wearing qualities are essential.

The "B" quality Cotton Cord is the most generally sold, although, in our judgment, the "A" quality is more desirable, being made of finer stock and more closely woven. All sizes up to No. 12 come in 100 feet hanks; larger sizes in 500 feet coils. The prices given below are on 100 feet lengths, but we sell any quantity, small or large.

	PRICE PER 100 FEET.						
No.	6	7	8	9	10	12	
Diam.,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$
B Cot'n,	\$0.50	.60	.75	.85	1.10	1.35	
A "	.65	.80	1.00	1.15	1.45		
Linen,	.95	1.15	1.40	1.60	2.15	2.70	

CORD GRIP.



The Cord Grip is a substitute for the knot used in hanging sash cord, it will not untie and makes quite a saving in cord. By using the larger sizes for the



FIG. 935. CORD GRIP.

smaller cord they can also be used for splicing in an end, such as would be necessary in the formation of a loop.

No. 8, dozen,	20 cents;	gross,	\$1.75
" 12 " 30 "	" "	" "	3.00
" 16 " 35 "	" "	" "	3.50

Will be pleased to name prices or furnish information in reference to Manila, Sisal and Hemp Ropes in all sizes and dimensions.

BRAIDED AWNING LINES.

The following Lines, although known as Awning Lines, are used by Masons, Upholsterers, and for all purposes where a fine, strong line is required. They are put up in hanks of 48 feet each.



FIG. 986.

No.	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$
Diameter,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Cotton, each,	\$0.15	\$0.20	\$0.25
" dozen,	1.50	2.00	2.50
Linen, each,	.25	.35	.45
" dozen,	2.50	3.50	4.50

We also have this cord in size No. 5, which measures $\frac{1}{2}$ inch in diameter; it comes in 100 feet hanks. Price, per hank, 75 cts.; per dozen, \$7.50.



FIG. 987. WIRE SASH CORD.

The above cut of Wire Sash Cord is the very best one we could get, and while it is not perfect it will show or give a fair idea of the Cord, which is made of fine wire twisted as an ordinary rope. It is very soft and pliable, and will prove very useful for a great variety of purposes.

Diameter.	Tinned.	Copper.
$\frac{1}{2}$ inch, per ft.,	2 cents;	4 cents.
$\frac{3}{4}$ " " "	2 $\frac{1}{2}$ " "	5 $\frac{1}{2}$ " "
$\frac{1}{2}$ " " "	3 $\frac{1}{2}$ " "	8 " "
$\frac{1}{4}$ " " "	4 $\frac{1}{2}$ " "	10 " "

We can also furnish the above Rope in galvanized or plain iron wire.

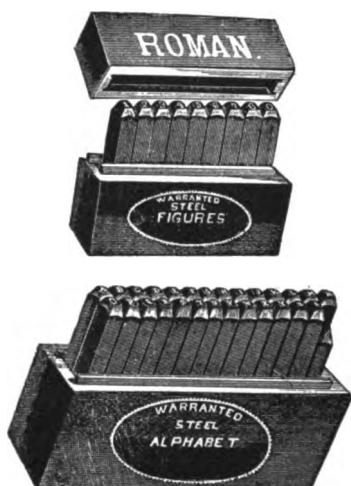


FIG. 988 STEEL LETTERS AND FIGURES.

Steel Letters and Figures and Name Stamps are essential, both in Mechanics' and Manufacturers' outfits. Manufactured goods should be plainly stamped with maker's name and address, and tools should be stamped so that they may be identified if lost or stolen. The owner's name on a tool may not prevent its being stolen, but a "tramp" will usually think twice before he steals a tool with the owner's name plainly stamped on it.

The greatly increased demand for Steel Letters and Figures (more especially in connection with typewriter work) has led to the designing of improved machinery for their manufacture, and a consequent lowering in price.

The Solid Steel Stamps, Fig. 989, have to be made by hand.

Size	Letters per set	Figures per set	Letters or Fig's, each.
$\frac{1}{8}$	\$3.00	\$1.00	\$0.25
$\frac{1}{4}$	2.70	.90	.20
$\frac{3}{8}$	2.10	.70	.15
$\frac{1}{2}$	2.10	.70	.15
$\frac{3}{4}$	2.10	.70	.15
$\frac{7}{8}$	3.00	1.00	.25
$1\frac{1}{8}$	3.60	1.20	.30
$1\frac{1}{4}$	4.20	1.40	.35
$1\frac{1}{2}$	6.00	2.00	.45
$1\frac{3}{4}$	10.00	3.60	.55



FIG. 989. SOLID STEEL STAMP.

We can furnish Name Stamps to order, of almost any design required. The prices given here are for Plain Stamps per letter.

Size, $\frac{1}{8}$ to $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$
Price, \$0.20	.25	.30	.35	.45	.55

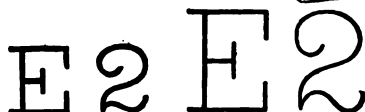
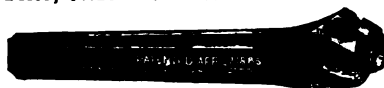


FIG. 990. CAST IRON LETTERS AND FIGURES.

The Cast Iron Letters and Figures are useful for stamping wood, leather, and soft metals. They can also be used for burning names and figures on wood; they are sharp and deep, and nicely finished. Made in two sizes, $\frac{1}{4}$ and $\frac{1}{2}$ inch.

Size	Figures per Set	Letters per Set
$\frac{1}{4}$ inch	\$1.50	\$4.50
$\frac{1}{2}$ "	2.50	7.50

FIG. 991. AUTOMATIC NUMBERING MACHINE.



FIG. 991

This Numbering Machine is small and light to handle, thus insuring speed and ease of operation. All wearing parts, including figure wheels, are of steel. This machine will be found useful for numbering time cards, checks, etc., etc.

Four-wheel Machine, numbering to 10,000, \$9.00; Five-wheel Machine, numbering to 100,000, \$10.50; Six-wheel Machine, numbering to 1,000,000, \$12.00.

Other sizes and styles of Machines furnished when desired.

PATTERN LETTERS AND FIGURES.

These Letters and Figures are used by Foundrymen, Machinists and Pattern-makers to put inscriptions of names, dates of patents, etc., on patterns of castings. These Letters are made of composition metal, somewhat harder than lead. We can furnish (to order only) Brass Pattern Letters in a great variety of styles. The Brass Pattern Letters can be soldered or "sweat" onto the patterns. The price of Brass letters is three times that of the Composition letters.

The sizes given are face measurements, the measurement over all being from $\frac{1}{4}$ to $\frac{1}{2}$ inch larger.



FIG. 992. ROMAN STYLE.

The Roman style letters are the most commonly used.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$ in.
Each,	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$ cts.
Size,	$\frac{1}{4}$	$\frac{1}{2}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2 in.
Each,	2	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	7 cts.

Can furnish additional sizes in the Roman pattern up to and including 4 inch.



FIG. 993. SHARP FACE GOTHIC.

The Sharp Face Gothic is, we think, the handsomest style of all, especially for nice machine work.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$ in.
Each,	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$ cts.
Size,	$\frac{1}{4}$	$\frac{1}{2}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$ in.
Each,	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$4\frac{1}{2}$ cts.

Can furnish additional sizes in the Sharp Face Gothic pattern up to 3 inch.



FIG. 994. HAIR LINE GOTHIC.

This is a very light letter, but will make a sharp, clean print upon hollow ware, or

stoves, where it is desired to have nearly a smooth surface. We keep them in four sizes, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{4}$ inch. Price per letter, all sizes, $1\frac{1}{2}$ cts.



FIG. 995.

FIG. 996.

ANTIQUÉ POINTED.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	1 inch.
Each,	3	$3\frac{1}{2}$	4 cts.

REVERSED.

The Reversed Letters, Fig. 996, are used for making Branding Irons, Moulds for Babbitt Metal, Brick and Artificial Stone.					
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 inch.	
Each,	4	4	5	$5\frac{1}{2}$	$5\frac{1}{2}$ cts.

We can furnish other sizes and patterns of Branding Letters if desired.



FIG. 997. NUMBERING PLATE.

These Numbering Plates are made of White Metal, with figures in relief and Japanned back ground; are used largely for Church pews, College and State-room doors, Post Office boxes, etc., etc.

Price, each, with $\frac{1}{2}$ inch Figures, 10 cts.; $\frac{1}{4}$ inch, 12c; $\frac{3}{4}$ inch, 16c; 1 inch, 20c.



FIG. 998. NAME PLATES.

These Plates are made of Brass, handsomely finished and nickel-plated (or left in brass finish, if desired). We furnish them in two widths, the length being in proportion to inscription.

The No. 1 Plates are $\frac{1}{2}$ inch wide, and from $2\frac{1}{2}$ to 3 inches in length. The No. 2 Plates are $\frac{3}{4}$ inch wide. No order taken for less than 12 of a kind.

	No. 1.	No. 2.
12 Plates from one Die,	\$1.35	\$1.75
25 " " " " "	2.00	2.60
50 " " " " "	3.00	4.00
100 " " " " "	4.00	5.50
300 " " " " "	8.75	10.50
500 " " " " "	11.00	13.50
1000 " " " " "	16.75	20.00

On larger quantities we will quote special prices.

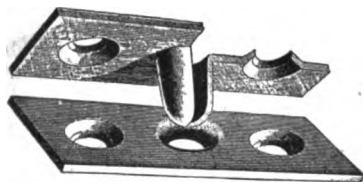


FIG. 999. BRASS PLATE DOWEL.

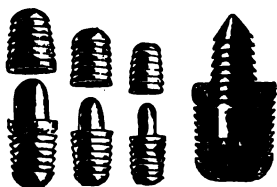


FIG. 1000. BRASS SCREW DOWELS.

The Plate and Screw Dowels represented in the above cuts are very much superior to the wooden pins, or pegs, commonly used. They do not swell with water, or shrink from heat; they save time and expense in pattern room and foundry, and castings from patterns on which these are used do not overlap.

PRICES OF PLATE DOWELS.

Size,	$\frac{1}{4} \times 1$	$\frac{1}{2} \times 1\frac{1}{2}$	$\frac{3}{4} \times 1\frac{1}{2}$	1×2
Gross,	\$4.25	\$5.00	\$5.75	\$9.50
Doz. post p'd	.45	.55	.65	1.00

PRICES OF SCREW DOWELS.

Diam. of Pin,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Per 100.	\$2.00	\$2.50	\$3.00	\$3.50
Doz., post p'd,	.30	.40	.45	.50



FIG. 1001. WHITE'S METALLIC FILLET.

The White's Metallic Fillet has been on the market for nearly ten years, and has come into very general use by pattern makers. The larger sizes are being used to quite an extent for glazing and weather stripping, and as a moulding and floor skirting in public buildings. It is put up in reels of 25 and 100 ft.

PRICE PER FOOT.

$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1 inch.
\$0.05	.06	.07	.08	.09	.10	.14



FIG. 1002. LEATHER FILLET.

This Fillet can be put in any corner, and as easily upon a compound curve as on a straight line. It is highly recommended for its lightness, durability and neatness; is put up in lengths of four feet, and in packages of 100 feet of each size.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Per package,	\$2.50	\$3.50	\$4.00	\$4.50
Per foot,	.03	.04	.05	.08
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Per package,	\$5.00	\$6.00	\$7.00	\$8.50
" foot,	.08	.07	.08	.10



FIG. 1003. WOOD FILLET.

This comes in 100 ft. bundles, 4 ft. long; is less in price than either of the others. Sold only in full bundles.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Per b'dle,	\$1.25	1.50	1.50	2.00	2.00

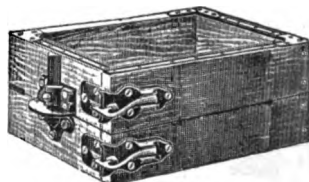


FIG. 1004. DIAMOND SNAP FLASK.

These Flasks are manufactured by machinery and put together by templets, they are all interchangeable on pins, and parts can be duplicated in case of breakage.

They are all constructed so as to be "knocked down" and folded for convenience in shipping and storing. Are made in great variety of sizes, and we will name prices of any desired size upon application.

We call special attention to Sets of Five. A Set of Five of any size comprises 5 drags, 2, 3, 4, 5, and 6 inches deep, and 5 copes, the same. They are so arranged as to be interchangeable, so that one can

make 25 different depths of flasks. These Sets are used largely for odd jobs that come into every foundry, and do away with the nailing on of strips to make the flasks suit the work. The sizes most in use are:

12 x 12 and 10 x 14;	price, per set,	\$21.50
14 x 14 " 12 x 16;	" "	23.00
14 x 16 " 15 x 16;	" "	24.00
14 x 18 " 16 x 16;	" "	24.50

We ship these set up and crated.



FIG. 1005.

DIAMOND ADJUSTABLE FLASK CLAMP.

These Clamps can be adjusted to suit any flask in an instant. Requiring no wedges, they will save the price of themselves in a short time. The Heads are made of malleable iron, with hardened balls, and the Tails of square bar iron.

			Per Doz.
No. 5,	adjusts from 6 to 10 inches,		\$3.40
" 6,	" " 10 to 14 "		3.70
" 7,	" " 14 to 10 "		3.80
" 9,	" " 7 to 12 "		5.00
" 10,	" " 12 to 17 "		5.40
" 11,	" " 17 to 22 "		5.80

The Nos. 9 to 11 are heavier than the others. Can furnish other sizes when desired.

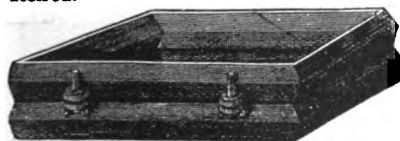


FIG. 1006. BRASS MOULDERS' FLASKS.

These Flasks are drilled with standard templates, bringing the holes the same in each flask, and avoiding the necessity of matching. The faces are accurately planed. We can furnish nearly 200 sizes.

We print here a few of the sizes which are most commonly sold

Width.	Length.	Depth over all.	Price Each.
10 inches	13 inches	5 inches	\$5.50
10 "	17 "	7 "	7.25
11 "	16 "	6 "	6.25
12 "	16 "	8 "	8.00
12 1/2 "	18 "	8 "	9.00

SMALL JEWELER'S FLASKS.

Width.	Length.	Depth over all.	Price, Each.
4 inches.	4 1/2 inches.	2 1/2 inches.	\$2.50
4 1/2 "	7 1/2 "	2 1/2 "	3.00
6 1/2 "	9 1/2 "	3 "	3.85

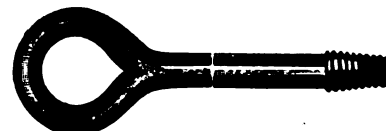


FIG. 1007.

RAPPING PLATE.

These goods were first placed on the market a few years since, and have met with great favor. They are easily and cheaply fitted, and are a most necessary accessory to patterns. All numbers from 1 to 6 are tapped 1/8 inch; Nos. 7 to 11, 1/4 inch; Nos. 12 to 17, 3/8 inch. Approximate measurements are as follows:

No.	Dozen.	Each.	Shape.	Size.
1	\$0.35	\$0.04	Oblong	1 1/2 x 1 1/2
2	.35	.04	"	1 1/2 x 2
4	.40	.04	"	1 1/2 x 1 1/2
6	.45	.05	"	1 1/2 x 2 1/2
8	.55	.06	"	1 1/2 x 3 1/2
10	.65	.07	"	1 x 3 1/2
12	.75	.08	Square	2 1/2
14	.95	.10	Oblong	1 1/2 x 4 1/2
17	1.90	.20	"	3 x 5 1/2



LIFTING SCREW

These Lifting Screws can be depended upon to hold the pattern steady while being drawn.

Size,	1/2 inch.	3/4 inch.	1 inch.	1 1/2 inch.
Per Dozen,	\$1.20	\$1.50	\$1.80	\$2.20
Each,	.12	.15	.18	.22

NO NAME FOLKS.—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name. If it is an order from him with money enclosed, we are pretty sure to hear from him, wanting to know where the goods are—and sometimes the letters are not overly civil; if it is a letter of inquiry and our correspondent gets no answer, he thinks we are inattentive or careless, and as a result we are apt to lose what might be a good customer.

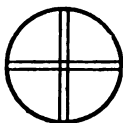
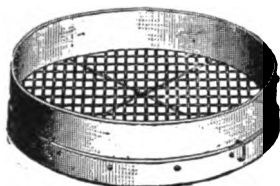
STYLE OF 4
CROSS WIRES

FIG. 1008. MOULDERS' RIDDLE.

Our Riddles are made of best materials, and of heavy wire. Unless otherwise ordered, they are made with four cross bars, which makes them much stronger than the ordinary Riddle.

	Steel.	Galvanized.	Brass.
Mesh,	2 to 16	2 to 8	2 to 16
Per Doz.,	\$4.50	\$5.50	7.50
Each,	.45	.55	.75

The above are all 18 inch diameter. We can furnish to order 16, 20 and 22 in.

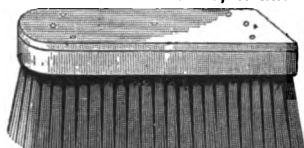


FIG. 1009. STEEL WIRE CASTING BRUSH.

In former catalogues, we showed three or four different shapes and priced some ten or twelve sizes of Steel Wire Casting Brushes. Our sales, however, are confined almost entirely to one size, the Five Row Brush, with 4 inch wires; these we sell at \$27.50 per gross, \$2.75 per doz., or 30 cents each.

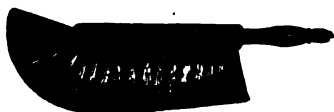
WIRE PUSH BROOMS.

These Brooms are used for warehouse and foundry use. Price, per dozen, \$5.00; each, 50 cents.

We also have a Push Broom that is made with an extra heavy block and of extra heavy wire. Price, per dozen, \$6.00; 60 cents each.

FIG. 1010. MOULDERS' SOFT BRUSH.
No. 3, 8 in. Regular, \$5.00 doz. 50c. each
" 5, 9 " Bristle . 8.00 " 75c. "

The No. 5 Brush, while seemingly expensive, is really the cheapest in the end; it is made with extra quality bristles, and one will outwear three common brushes.

FIG. 1011. BENCH, OR COUNTER BRUSH.
These Brushes are made of gray bristles.

No.	Each.	Doz.	Length Blade.
3	\$0.50	\$5.25	8 inches.
4	.60	6.50	8 1/2 "
5	.75	8.00	9 "

*Patent Low
Ann. See index.*



FIG. 1012. MOULDERS' BELLOWS.

Width, in.,	9	10	11	12
Per dozen,	\$10.50	\$12.00	\$13.00	\$14.00
Each,	1.00	1.20	1.30	1.40



FIG. 1013. MOULDERS' SHOVELS.

Price, per dozen, \$9.00 to \$12.00; each, 85 cents to \$1.20



FIG. 1014. BENCH RAMMER.

Price, per pair, 50 cts.; each, 30 cts.

FLOOR RAMMER.

Price complete, each, \$1.00

FIG. 1016
MOULDERS' SWABS.

We have these both in Hemp and Flax. Price, per doz., from \$2.00 to \$3.00; each, 20 cts. to 30 cts.



FIG. 1017. COKE FORK.

These Forks are used not only for coke, but for shavings, bark and any light, bulky material.

Price, each, 10 Tine. \$1.75 12 Tine. 2.00 14 Tine. 2.25

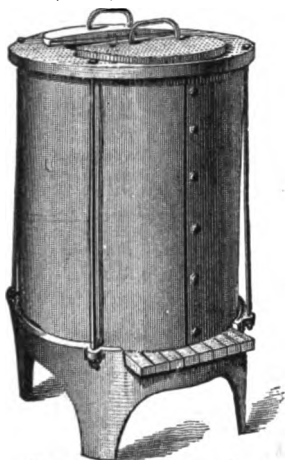


FIG. 1018.

BRASS
FOUNDERS'
MELTING
FURNACE.

The above Furnace is 27 inches in height, 22 inches inside diameter; is suitable for No. 30 crucible, weight, 370 lbs. Price, complete, with exception of brick lining, \$35.00.

CRUCIBLES.



FIG. 1019. labor, etc.—are dear at any CRUCIBLE. price.

These crucibles need no special care in use, except to see that they are kept in

We sell only the Black Lead Crucibles made by the Jos. Dixon Co. Poor Crucibles—those that flake, or crack, or drop the metal in the ashes, thus losing not only crucible and contents, but coal, time, labor, etc.—are dear at any

a dry place and heated gradually when used the first time.

No.	Each.	Height, in.	Diam., Outside.	Cap'y, Water, lb.
0	\$0.25	2	1½	
00	.25	2½	1½	
1	.25	3½	2½	½
2	.28	3½	3	1
4	.32	5	4½	1
6	.40	5½	4½	1½
8	.45	6½	5	2½
10	.50	7½	5½	3
14	.60	8½	7½	5½
16	.64	9	7½	6½
18	.72	9½	7½	7½
20	.80	9½	8½	8½
25	1.00	10½	8½	10½
30	1.20	11½	9½	13
35	1.40	11½	9½	15½
40	1.60	12½	10½	18
50	2.00	13½	10½	22
60	2.40	13½	11½	24
80	3.20	15	12	29
100	4.00	16	12½	32½

Larger and intermediate sizes furnished to order. The capacity, as given in above table, is in lbs. of water. Eight pounds of ordinary brass are about equal in bulk to one pound of water.

FIG. 1020.
PATTERN
MAKERS'
PINCH
DOGS.

These are made of steel, and used for drawing together and holding two pieces of wood while glueing or fitting. They are perfectly interchangeable, that is, when one is driven into the wood and withdrawn, any other one of the same size will go into the same place, thereby saving the making of more holes. These will be sent post-paid.

Size, ½ 1½ 2 2½ inch.
Dozen, \$1.00 \$1.50 \$2.00 \$2.50
Each, .10 .15 .20 .25

PATTERN MAKERS' KNIFE.

This tool is very popular among pattern makers, and will be found of value to any mechanic. The handle is made of Rosewood, with nickel-plated brass tips. The blades are 7 inches long, ½ inch wide, and about ¼ inch thick. Sent post-paid.



FIG. 1021. PATTERN MAKERS' KNIFE.

Handle with 1 blade, \$1.90
Handle only, .90
Blades only, .30

MOULDERS' TOOLS.

We carry in stock the Charles Monk make of Moulders' Tools. These tools are generally conceded to be the best as regards temper, shape and finish. Any tool can be sent by mail, and the prices given here include postage.

FIG. 1022.
SQUARE TROWEL.



Length,	4 in.	4½ in.	5 in.	5½ in.	6 in.
1 in. wide,	\$0.45	\$0.50	\$0.55		
1½ " "		.50	.55		
1¾ " "		.60	.65	\$0.70	\$0.75
1¾ " "		.75	.80	.85	
2 " "		.85	.90	.95	

FIG. 1023.
NO. 1 FINISHING TROWEL.

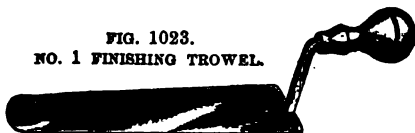


FIG. 1024.
NO. 2 FINISHING TROWEL.



We can furnish the Nos. 1 and 2 Finishing Trowels in two widths, 1½ and 1¾ inch, and in two lengths, 5 and 6 inches. Prices are the same as Square Trowels.

FIG. 1025. HEART TROWEL.

Width,	2 inch	2½ inch	3 inch
Each,	\$0.50	\$0.75	\$1.00



FIG. 1026. YANKEE SLICK.

Width,	½ inch	¾ inch	1 inch
Each,	\$0.45	\$0.50	\$0.55



FIG. 1027. HEART AND SQUARE.

Width,	1 inch	1½ inch	1¾ inch	1¾ inch
Each,	\$0.45	\$0.55	\$0.65	\$0.75



FIG. 1028. TAPER AND SQUARE.

Width,	¾ inch	1 inch	1½ inch
Each,	\$0.40	\$0.45	\$0.55



FIG. 1029. TAPER AND SPOON.

Width,	1 inch	1½ inch	1¾ inch
Each,	\$0.45	\$0.55	\$0.65



FIG. 1030. SQUARE STRAIGHT.

Width,	¾ inch	1 inch	1½ inch	1 inch
Each,	\$0.45	\$0.60	\$0.55	\$0.65



FIG. 1031. STOVE TOOL.

Width,	¾ inch	1 inch	1½ inch	2 inch
Each,	\$0.40	\$0.45	\$0.50	\$0.55



FIG. 1032. BENCH LIFTER.

Width,	¾ inch	1 inch	1½ inch
Each,	\$0.40	\$0.45	\$0.50

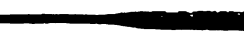


FIG. 1033. LIFTER.

Length,	10 in.	12 in.	14 in.	16 in.	18 in.
½ in. wide,	\$0.35	\$0.40			
¾ " "	.40	.45	\$0.50		
1 " "	.45	.50	.55	\$0.60	
1½ " "		.60	.65	\$0.70	
2 " "		.65	.70	.75	



FIG. 1034. OVAL DOG TAIL.

Width,	¾ inch	1 inch	1½ inch
Each	\$0.50	\$0.60	\$0.70



FIG. 1035. HALF-ROUND. FIG. 1036. SQUARE. FIG. 1037. INSIDE SQUARE.
Half-Round Corner, 1 to 2 inches, \$0.50 each; Square Corner, 2, 2½ or 3 inches, \$0.50 each; Inside Square Corner, 2, 2½ or 3 inches, \$0.75 each.

OILERS.

The Zinc Oiler, Fig. 1038, we show as a matter of habit and duty. They have but one thing to recommend them—the price. They are sold in large numbers, but with the better class of users, such oilers as the Noera, Draper and others of more modern make and style are rapidly taking their place.

Brass Oilers of the same style as shown in Fig. 1038, are also sold to a limited extent

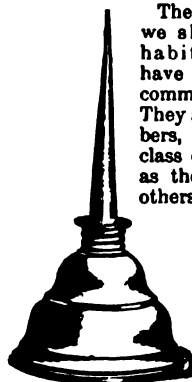


FIG. 1038.

No.	Zinc.		Brass.		Diam. of Bottom, in.	Cap. oz.
	Each.	Doz.	Each.	Doz.		
0	\$0.06	\$0.50	\$0.12	\$1.15	2½	2
1	.08	.65	.15	1.25	2¾	3
2	.10	.75	.18	1.50	3½	5
3	.12	.90	.20	1.75	3¾	7
4	.15	1.15	.25	2.25	4	10
5	.20	1.50	.30	3.00	4½	12
6	.25	2.00	.40	3.50	4¾	16

FIG. 1039.
MALLEABLE.

FIG. 1040. NOERA.

The Malleable Iron Oilers, Fig. 1039, are durable and strong.

No.	Each.	Doz.	Capacity, oz.
1	\$0.30	\$2.70	2
2	.35	3.00	4
3	.40	3.30	6

The Noera Steel Oiler, Fig. 1040, is the *strongest and most serviceable Oiler made.*

In appearance, they are painfully "plain," but they are much handsomer—or rather less ugly—than they used to be, and we still have hopes that the maker will some day either bronze or paint them, or buy a buffing lathe and some wheels and go to an expense of 6 or 8 cents a dozen to have them polished. They are made of heavy sheet steel, the spout is of steel, extra heavy and strong. Each, 40 cts.; per dozen, \$4.25; capacity, 6 oz.



FIG. 1041. DRAPER.

FIG. 1042.
BENT SPOUT.

The Draper Oilers (manufactured by Noera Mfg. Co.) are made in Steel, Brass, and Brass nickel plated, they are the most popular with our trade of any oiler we sell. The bodies are stamped out of heavy steel and brass stock; the screws and spouts are heavy and strong, they have brass buttons securely fastened, and are all handsomely finished.

DRAPER STEEL OILERS.

No.	Each.	Doz.	Diam.	Spout.	Cap., oz.
12	\$0.27	\$2.70	2½	2½	3
13	.33	3.30	3½	3	6
14a	.45	4.50	3¾	3	10
15	.60	5.75	4½	3	14

WITH LONG BENT SPOUT.

We can furnish any of the above sizes of Oilers, excepting No. 12, with 9 inch long bent spout, see Fig. 1045, at an additional cost of 8 cts. each, or 70 cts. per dozen.

IT WILL BE NOTICED that we give in connection with oilers, the capacity of the various sizes. The weight of oil is approximately 16 oz., or 1 lb. to the pint.

DRAPER BRASS OILERS.

No.	Each.	Doz.	Diam., in.	Spout, in.	Cap. oz.
120	\$0.45	\$4.55	2½	2½	3
130	.55	5.60	3½	3	6
140a	.70	7.15	3½	3	10
150	.85	8.40	4½	3	14

WITH LONG BENT SPOUT.

We can furnish any of the above sizes of oilers, excepting No. 120, with 9 inch spout, see Fig. 1042, at an additional cost of 10 cts. each, or \$1.00 per doz.

NICKEL PLATED OILERS.

No.	Each.	Doz.
120, N. P., same as above,	\$0.65	\$6.30
130 " " " "	.75	7.30
140 " " as No. 130 with 9 inch long bent spout, .85		8.35

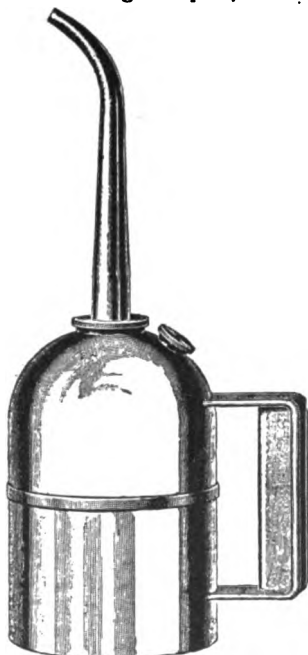


FIG. 1043. RAILROAD OILER.

These Oilers are of the regular standard sizes and patterns used on railroads; are adapted for both locomotive and stationary engines, they are made of two

heavy steel seamless drawn parts, large nozzle, 1½ inch at base.

No.	Each.	Doz.	Nozzle.	Height.	Capacity
100	\$1.00	\$9.80	9 in.	6 in.	1 pint.
101	1.95	12.60	10 "	6 "	1 qt.
111	1.40	14.00	9 or 14 "	8 "	2 qts.

We can also furnish a line of both steel and brass oilers with practically the same body as Nos. 100 and 101, but with thinner and longer nozzles. the nozzles being 12 and 18 inches respectively. Price in steel being same as Nos. 100 and 101; for brass, add 30 cts. each or \$3.00 per doz.



FIG. 1044. ZINC FILLER.

1 pint, each, 35 cts.; per dozen, \$3.60
1 quart, " 55 " " 5.40



FIG. 1045. ENGINEERS' FILLERS.

The Noera Engineers' Fillers are made of very heavy stock, and handsomely finished, in both brass and steel; all have heavy screw tops.

STEEL.

No.	Each.	Doz.	Diam.	Height.	Capacity
19a	\$1.20	\$11.90	4½ in.	4 in.	1½ pints
210	1.40	14.00	5 "	5 "	1 quart
211	1.65	16.80	6 "	6 "	2 quarts

BRASS.

No.	Each.	Doz.	Diam.	Height.	Capacity
190	\$1.50	\$15.00	4½ in.	4 in.	1½ pints
200	2.00	21.00	5 "	5 "	1 quart
201	2.25	23.80	6 "	6 "	2 quarts

TORN CATALOGUES.—Every article in this catalogue is very plainly described, either by figure, number, regular number, or name; and we beg our customers not to cut or tear out pages, or parts of pages, as this mutilates the book, and when done to any extent, destroys it for reference.

There is nothing that finishes and "sets off" an engine room as much as a handsome set of Oilers.

The Engineers' Sets we offer here are handsomely finished, very much superior in every way to the common, thin spun metal oilers, and quite reasonable in price. The trays are of heavy brass.

Set No. 30, \$4.25. Consists of Tray and 1 each Nos. 120, 130 and 140 Brass Oilers, and No. 190 Brass Filler.

Set No. 50, \$5.75. Same as No. 30; heavily nickel plated.

Set No. 40, \$6.30 (See cut). Same as No. 30, excepting that the tray and filler are larger and it has in addition one long, straight Spout Oiler.

Set No. 60, \$7.75. Same as No. 40; heavily nickel plated.

STEAM BOAT SETS.

For the use of Steamboat Engineers we furnish the same sets as above with

Special Tray having recesses to receive bottoms of oilers, so that the motion of the boat will not shake them about. For price of Steamboat Sets add \$1.00 to price list above.

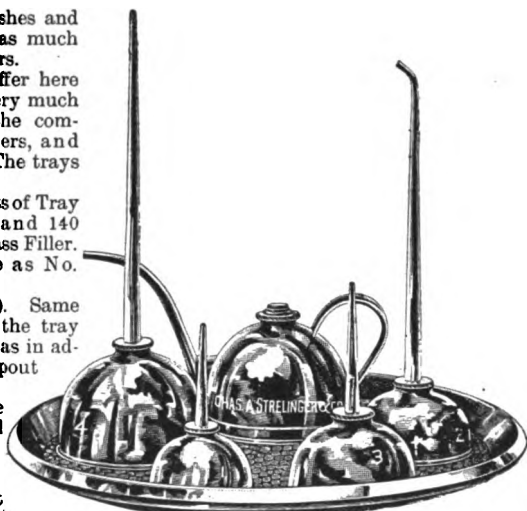


FIG. 1046. ENGINEERS' SET NO. 40.

PERFECTION OILERS.

The Perfection Oil Can starts and stops the flow of oil instantly by an air-tight cut-off at the inner opening of the spout, and is operated at will, by pressing connecting push-stem just in front of can handle (see cut) Fig. 1047.

In use the spout remains full of oil. The flow starts by the pressure of oil and air the instant the valve is raised from its seat inside the can. The flow is stopped as instantly by the valve returning to its place. The air pressure at the end of the spout prevents one drop from escaping.

Its great utility will at once be apparent, because it saves the time required by other cans to start the flow, and prevents the oil from flowing except when wanted.

Having the oil under perfect control is a great aid in keeping machinery clean.

In oiling many kinds of machinery the spout of the oil can is necessarily pointed

downward, and in using the common can as much oil runs out on the ground or floor as is used for the machine. The Perfection Can saves all this loss and annoyance for no oil escapes from it until the push stem is pressed, no matter what the position of the can.

No user of oil can afford to be without the Perfection Oil Can, they are made in the best possible manner, strong in every part, uniform in size and quality, are carefully tested and inspected, making them complete in every respect, before being placed on the market.



FIG. 1047.

PERFECTION HAND OILERS.

For prices, see next page.

PERFECTION HAND OILERS.

The Perfection Hand Oilers, Fig. 1047, are, as far as shape is concerned, comparatively new in this country, although for a great many years used by engineers abroad. The tin oilers are made of *ixx* charcoal plate, and like the entire line of Perfection Oilers are handsomely finished.

No. 25, $\frac{1}{2}$ pint, Tin, 60 cts.; Brass, \$0.90
 " 27, 1 " " 70 " " 1.05
 " 22, 1 quart " 90 " " 1.35

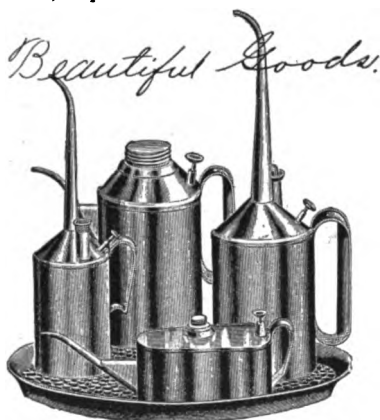


FIG. 1048. PERFECTION ENGINEERS' SET.

No.
 502 \$5.20, 5 pieces counting Tray, Brass.
 503 6.40 6 " " " "
 504 7.20 5 " " " " Nickeled.
 505 8.80 6 " " " " "



FIG. 1049. TRAYS.

PRICE LIST OF TRAYS.

These are made of Hammered Brass, are heavy and durable.

13 inch diameter, Brass, \$0.65 each.
 13 " " Nickle Pl'd, 1.00 "
 15 " " Brass, .90 "
 15 " " Nickle Pl'd, 1.35 "



FIG. 1050. TALLOW POT.

No. 6, 55 cts., 1 qt., tin.
 " 7, 80 " 1 " brass.

FIG. 1051.
PERFECTION
DRIP OILER.FIG. 1052.
PERFECTION FILLER CAN.

The Perfection Drip Oilers, Fig. 1051, have spouts 10 to 14 inches long that are made double, they are therefore very strong and durable.

No. 36, 1 pint, tin, 75 cts.; brass, \$1.15
 " 38, 1 quart, " 90 " " 1.35

PERFECTION FILLER CANS.

No. 40, 1 pint, tin, \$0.75; brass, \$1.15
 " 41, 1 quart, " .90 " 1.35
 " 42, 2 quarts, " 1.10 " 1.60

Can furnish any of the style of oilers represented in Figs. 1047, 1048, 1051 and 1052, without the cut-off valve at two-thirds of the prices given.

LAMPS AND TORCHES.



FIG. 1053.

FIG. 1053. STEEL HAND LAMP.
20, each, 40 cts.; doz., \$4.20; 3½ in. diam.
20½ " 60 " " 6.30 3½ " "

FIG. 1054. ENGINEER'S TORCH.
Capacity, 1 quart, tin, each, 45 cents.;
brass, 75 cents.



FIG. 1054.



FIG. 1055.

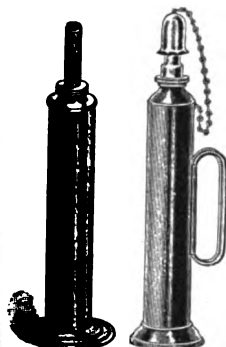


FIG. 1056.

FIG. 1057.

Fig. 1055, Plumbers' Torch, made with
heavy cast brass screw.

No. 11, Tin, each, 70 cts.; Brass, each, \$1.25

Figs. 1056 and 1057, Railroad Torches,
13 inches high.

Fig. 1056. Tin, 45 cents; Brass, \$0.75

" 1057. " 75 " " 1.25

The No. 2 has heavy cast brass screw.



FIG. 1058.

BRASS ALCOHOL
LAMP.

No. 25, 50 cts.
each, made of
heavy polished
brass.

BRASS OIL HOLE CAPS.

Fig. 1059 illustrates a little device for
closing the oil holes of tools and machines,
designed to take the place of the wood
plugs ordinarily used. These once fitted
are always in place, are perfectly dust
proof, and have no loose parts to be lost.
They can be opened and closed by the
fingers in a second, and their presence is
a constant reminder to the operator of the
machine, that they indicate a part that
must be oiled; can be used in a vertical,
horizontal or inclined position.

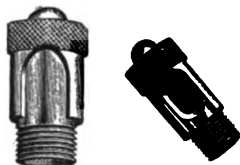


FIG. 1059. BRASS OIL HOLE CAPS.

No.	Each.	Doz.	Diam. of Body.	Diam. of Cap.
0	\$0.08	\$0.75	1/8	1/8
1	.08	.75	1/4	1/4
2	.10	1.00	1/2	1/2
3	.12	1.25	3/4	3/4
4	.15	1.50	7/8	7/8



FIG. 1060. BRASS LOOSE PULLEY OILER.

This Oiler is attached to hub of pulley,
is easily filled and regulated, will not
throw or waste oil, one filling lasting from
three to four weeks, and feeding only
when in motion.

No.	Each.	Doz.	Diam	Pipe Thr'd.
01	\$0.25	\$2.70	1 in.	1/4 in.
02	.30	3.24	1 1/2 "	1/2 "
03	.40	4.30	1 3/4 "	3/4 "
04	.50	5.40	2 "	1 "
04	.65	7.00	2 1/2 "	1 1/2 "

FIG. 1061.
PLAIN.

FIG. 1062.



FIG. 1063.



FIG. 1064. SIGHT AND STOP FEED.

are similar to Fig. 1063, but have the Sight-Feed, as shown in Fig. 1064:

LOCOMOTIVE PATTERN. GLASS BODY OIL CUP.

PRICES OF PLAIN AND LOCOMOTIVE CUPS.

No.	Each.	Dozen.	Each.	Dozen.	Outside Diam.	Pipe Thd.
00	\$0.15	\$1.50	\$0.18	\$1.80	$\frac{1}{8}$	$\frac{1}{8}$
0	.18	1.80	.22	2.10	$\frac{1}{4}$	$\frac{1}{4}$
1	.22	2.10	.25	2.40	$\frac{3}{8}$	$\frac{1}{2}$
2	.25	2.40	.30	3.00	1	$\frac{1}{2}$
3	.36	3.60	.45	4.50	1 $\frac{1}{2}$	$\frac{1}{2}$
4	.55	5.40	.60	6.00	1 $\frac{1}{2}$	$\frac{3}{4}$

GLASS BODY OIL CUPS.

Fig. 1063 represents a popular style of Glass Body Oil Cup, with Slide Top and Index.

No.	Each.	Dozen.	Diam. of Glass.	Holds Ounces.	Pipe Thread.
11	\$0.45	\$4.50	1 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$
12	.50	5.10	1 $\frac{1}{2}$	1	$\frac{1}{8}$
13	.55	5.70	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{8}$
14	.65	6.30	2	2	$\frac{1}{8}$
15	.75	7.50	2 $\frac{1}{2}$	3	$\frac{1}{8}$
16	.95	9.75	2 $\frac{1}{2}$	4	$\frac{1}{8}$
17	1.40	14.40	3	8	$\frac{1}{8}$

We can furnish any of the above Cups Nickel-plated at 10 cents extra, each.

SIGHT FEED OIL CUPS.

(Not illustrated.)

The following numbers, from 32 to 37,

No.	Each.	Dozen.	Diam. of Glass.	Holds Ounces.	Pipe Thd.
32	\$0.85	\$8.40	1 $\frac{1}{2}$	1	$\frac{1}{8}$
33	.90	9.00	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{8}$
34	.95	9.75	2	2	$\frac{1}{8}$
35	1.05	11.10	2 $\frac{1}{2}$	3	$\frac{1}{8}$
36	1.30	13.50	2 $\frac{1}{2}$	4	$\frac{1}{8}$
37	1.90	19.65	3	8	$\frac{1}{8}$

SIGHT-FEED OIL CUPS, WITH STOP FEED.

FIG. 1064.

No.	Each.	Dozen.	Diam. of Glass.	Holds Ounces.	Pipe Thd.
52	\$1.00	\$10.50	1 $\frac{1}{2}$	1	$\frac{1}{8}$
53	1.10	11.25	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{8}$
54	1.15	12.00	2	2	$\frac{1}{8}$
55	1.25	13.35	2 $\frac{1}{2}$	3	$\frac{1}{8}$
56	1.50	15.75	2 $\frac{1}{2}$	4	$\frac{1}{8}$
57	2.00	21.90	3	8	$\frac{1}{8}$

For any of the above Cups Nickel-plated, add 15 cents to price.

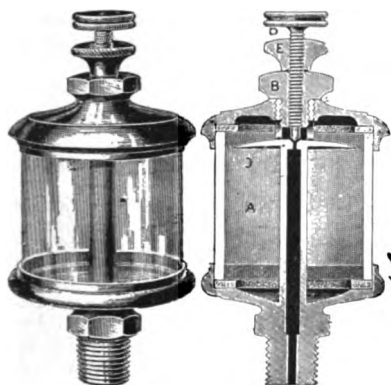


FIG. 1067.

AUTOMATIC CRANK-PIN OIL CUP.

This cup can be emptied in five minutes, or can be so regulated as to feed for four weeks. The feed is increased and diminished in proportion to variation of engine, the oil ceasing entirely to flow when engine stops.

No.	Each.	Dozen.	Diam. of Glass.	Holds Ounces.	Pipe Thd.
1	\$0.90	\$9.00	1½ in.	½	½
2	1.20	12.00	1½ "	1	½
2½	1.35	13.50	1½ "	1½	½
3	1.50	15.00	2 "	2½	½
4	1.90	18.00	2½ "	3½	½
5	2.70	27.00	2½ "	6	½

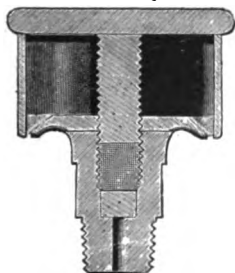


FIG. 1068. BRASS GREASE CUP.

This Cup is well adapted for jarring machinery, and is unsurpassed where a simple, compact and efficient cup is wanted; it is handsomely polished and finished.

All Oil Cups are threaded standard Gas Pipe sizes, and will be shipped with shanks threaded as listed, unless otherwise specified in order.

We can furnish any of these Oil Cups nickel-plated and polished, at an additional cost of about 10 per cent.

No.	Each.	Dozen.	Inside Diam.	Pipe Thrd.
00	\$0.42	\$4.20	1 inch	½
0	.54	5.40	1½ "	½
1	.70	6.90	1½ "	½
2	.90	9.00	2 "	½
3	1.25	12.90	2½ "	½
4	1.75	17.40	3 "	½

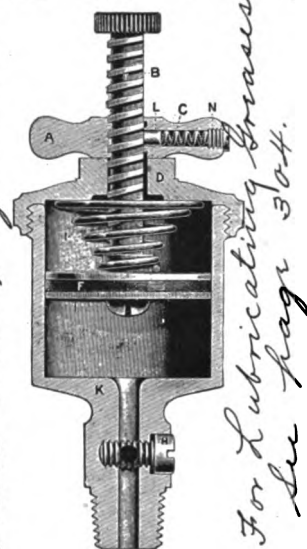


FIG. 1069. IMPROVED AUTOMATIC COMPRESSION GREASE CUP—BRASS.

This Cup is provided with a leather packed plunger, which can be raised or lowered from the outside by means of a thumb nut. The rate of feed can be regulated, and if it is desired to stop the flow of grease, the thumb nut can be turned down to cover, thereby taking tension off spring; is handsomely polished and finished, and can be furnished nickel-plated at an additional cost of 10 per cent.

No.	Each.	Dozen	Inside Diam.	Pipe Thrd.
0	\$1.00	\$10.80	1½ in.	½ in.
1	1.25	13.50	1½ "	½ "
2	1.60	17.25	2 "	½ "
3	2.00	22.50	2½ "	½ "
4	3.00	32.40	3 "	½ "

LUBRICATORS.

The proper lubrication of valves and cylinders of steam engines is a question of prime importance. The old methods of oiling involved not only an enormous waste of oil, but as the oil was introduced at irregular intervals, and in irregular quantities, the valves and cylinders were more often dry than otherwise.

The introduction of the Sight-Feed feature, which shows the oil rising drop by drop, on its way to the parts to be lubricated, enables the engineer to see at a glance how rapidly the oil is being fed; and by the use of the Feed Valve, the

Lubricator can be adjusted to feed any quantity desired, even as low as one drop in five minutes. They are adapted to feed any clean oil, white or black, light or heavy.

The Detroit Lubricators have been on the market for twenty years, and we believe they are superior goods in every respect.

The prices of Lubricators are about one-fourth of what they used to be, and the quality of workmanship, materials, etc., have improved with the lowering of the price. Queer, aint it?

Size.	For Cylinder.	Brass Finish.	Nickel Plated.
$\frac{1}{2}$ pint,	Under 10 in.	\$4.50	\$5.00
$\frac{1}{4}$ " "	10 to 12 " "	4.90	5.50
1 " "	12 to 18 " "	6.90	7.50
1 quart,	18 to 30 " "	8.90	9.75
$\frac{1}{2}$ gallon,	30 and over	11.00	12.00
1 " "		15.00	16.50

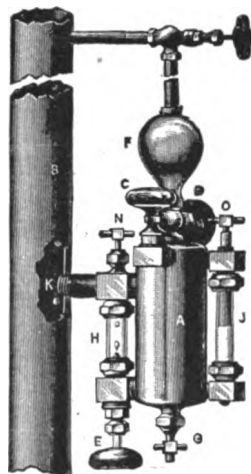


FIG. 1070. DETROIT STANDARD LUBRICATOR, FOR STATIONARY ENGINES.

- A—Oil Reservoir.
- B—Steam Pipe.
- C—Oil Filler.
- D—Water Feed Valve.
- E—Valve to regulate flow of Oil.
- FF—Steam Tube and Condensing Chamber.
- G—Drain Valve to draw off Water from Tube, prevent freezing, etc.
- H—Sight-Feed Glass
- J—Glass Indicator.
- K—Oil Discharge Pipe.
- N—Valve to correct pulsation, or unsteadiness in feed.
- O—Vent.

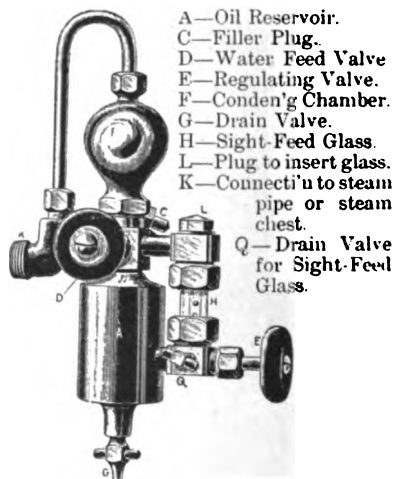


FIG. 1071. DETROIT STYLE "C" LUBRICATOR FOR TRACTION ENGINES.

This is a Single Connection Lubricator, and is used where it is desirable to discharge the oil either into steam pipe below the throttle or into steam chest or cylinder. Its construction is such that the oil cannot be syphoned out, and a regular and steady feed is thus obtained.

Size,	$\frac{1}{2}$ pint.	$\frac{1}{4}$ pint.	$\frac{1}{8}$ pint.
Brass Finish,	\$3.50	\$3.80	\$4.30
Nickel Plated,	4.00	4.50	5.00

WILSON'S OIL FILTER.

At the present time all high-speed Engines, Dynamos and many other rapid running machines are designed with devices for gathering waste oil from journals and bearings, and many old machines are being provided with such devices.

Such waste oil may be refined and rendered as serviceable as fresh oil.

The special object in planning this Filter has been to produce, at a low price, one so simple in construction that its arrangement would be readily understood, in which all parts requiring cleansing would be so accessible as to leave no excuse for neglect, and at the same time be so effective as to perform the work perfectly.

No.	Price.	Daily Capacity.	Diameter.	Height.
15	\$16.65	3 to 5 gals.	15 inches.	25 inches.
25	20.00	4 " 7 "	16 "	32 "
30	21.60	5 " 9 "	18 "	36 "
40	25.00	6 " 12 "	19½ "	40 "

ROPER OIL SEPARATOR.

The Centrifugal Oil Separator is designed to thoroughly and quickly remove the oil from metal turnings formed in the manufacture of bolts and screws, and from small articles such as screws, bolts, nuts, etc., which in their manufacture are

coated with oil.

FIG. 1072.

It is estimated by some who have used the machine that the saving of oil, in any manufacturing establishing consuming annually from eight to ten barrels of oil, will be amply sufficient to warrant and necessitate the purchase of a Roper Oil Separator.

This revolving drum has within it a removable pan, in which the oily chips, turnings or screws are placed, the pan being removed to discharge its contents when the oil has been thrown off between it and the metal cover, locked down closely by a lock-nut. The oil discharged into the outer casing is delivered from an outlet into a suitable vessel, ready to be used over again.

Price, \$110.00

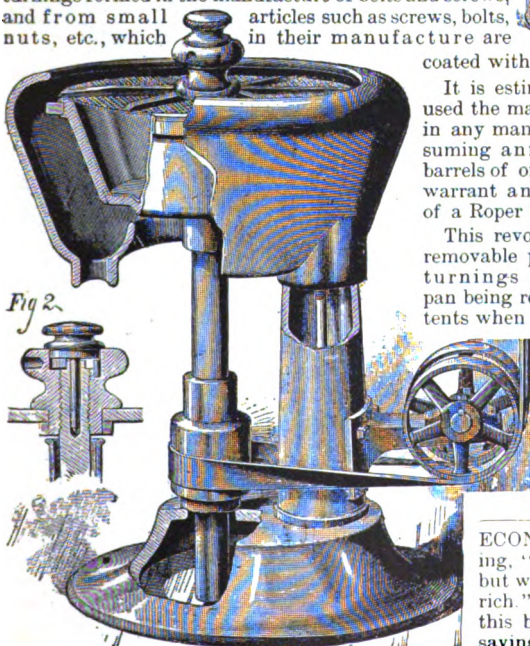


FIG. 1073. ROPER OIL SEPARATOR.

ECONOMY—There is a wise saying, "It is not what a man makes, but what he saves that makes him rich." We present throughout this book a great many labor-saving, therefore money-making, Machines and Devices.

OIL TANKS AND CANS.

The line of Tanks and Cans which we show here is, in point of finish, quality of materials and workmanship, the best that can be produced. We cannot compete with the cheap, light tanks that are sold generally, or *given away*, to secure the sale of a barrel of oil.



FIG. 1074.

AZTEC OIL TANK.

This is the cheapest Tank we care to sell. It is made of best quality galvanized iron in body, bottom and pan. Wood bottom under the metal. The price includes a Force Pump, as shown in Fig. 1074.

30 gals.	\$6.00
60 "	7.00
100 "	12.00
160 "	15.60
250 "	20.40



FIG. 1075. CONE TOP OIL TANK.

These Tanks have been in use for over twenty years, and are the standard. They are made from heavy galvanized iron, and of full capacity. The price of all sizes includes a Measuring and Lift Pump.

30 gals.	\$9.75	160 gals.	\$21.50
60 "	13.00	250 "	29.00
100 "	17.75		



FIG. 1076. AZTEC OIL PUMP.

This Pump is 1½ inches in diameter, with special Valve and Brass Stuffing Box. Price, each, \$2.00.



FIG. 1077.

PATENT MEASURING PUMP.

The discharge tube is small enough to go into all styles of Oilers, and, as the Pump measures accurately, Oilers can be quickly filled and not run over. The valves of these Pumps are of brass, ground air-tight and carefully tested.

Price, \$4.00.

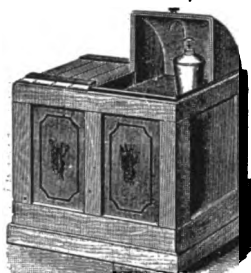


FIG. 1078.

CABINET OIL TANK.

These Tanks are made of heavy galvanized iron, are protected by wood frame, mounted on three-wheel casters, and all nicely finished.

With Measuring Pump, 60 gals., \$18.00; 110 gals., \$23.00; Double, 55 gals. at each end, with 2 Pumps, \$30.00.

STRAIGHT TANK.

We can furnish to order Straight Tanks, both high and low pattern, with brass Faucets, or any style of Gate, made of any material, in all sizes from 10 to 600 gallons capacity.

Prices and descriptions upon application.

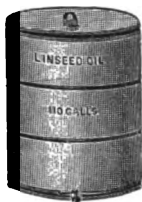


FIG. 1079.

EVENDEN SHIPPING CAN.



FIG. 1080.

These Cans are made of heavy material, best workmanship. They are the highest priced, and the best Shipping Cans in the market.

Gallons,	1	2	3	5	10
Dozen,	\$3.50	\$4.85	\$6.00	\$7.50	\$13.00
Each,	.35	.45	.60	.70	1.25

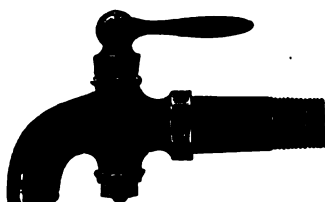


FIG. 1081. PETROLEUM FAUCET.

The keys of these faucets are bushed with brass.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 in.
Each,	\$0.45	.50	.60	.75



FIG. 1082. SELF-CLOSING WATER FAUCET.

This can be used as a self-closing water faucet or not, as desired, by simply removing or replacing the spring.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 in.
Polished Brass, each,	\$1.10	1.25	2.00	

Can also furnish these, either Silver or Nickel plated.



FIG. 1083. STEBBINS' GATE.

Inside diam.,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 in.
Each,	\$0.30	.35	.40	.50



FIG. 1084. PERFECTION GATE.

This Gate has been on the market for the past seven years. It is warranted to hold any kind of liquid from the thickest

syrops and varnishes to the thinnest fluids, such as benzine, naphtha, etc.; is self-adjusting, compact and strong. In our judgment one of these Gates is worth half-a-dozen of any other kind. The measurements given in table are inside. We can supply various other sizes not given in list.

Size,	$\frac{1}{4}$	1	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.
Jap. Iron,	\$0.65	\$0.75	\$0.95	\$1.25	\$1.75
Pol. Brass,	1.65	2.50	3.25	4.00	5.00



FIG. 1085. GRAPHITE OR BLACK LEAD.

This is used dry for steam and air cylinders, and mixed with fats or oils for a lubricant. It can often be used where oil or grease cannot be applied. It is good for preventing hot boxes, and is equally useful for either wood or metal friction surfaces, and on loom and spindle work, where oil or grease will spoil the fabric.

The Dixon Graphite is perfectly pure, and is much finer in quality than the black lead ordinarily sold. It comes in packages of sizes, as given in table below:

The $\frac{1}{4}$, $\frac{1}{2}$ and 1 lb. packages are paper can; the 5 and 10 lb., tin cans with screw top, and the 25 and 50 lb., wooden boxes.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	1	5 lbs.
Each,	\$0.10	.15	.20	.85
Size,	10	25	50 lbs.	
Each,	\$1.60	3.50	6.50	

We can also furnish, when desired, any of the Jos. Dixon Crucible Co's products, among them being Smear Grease, Car Grease, Machinery Grease, Graphite Grease for wire ropes, Silica-Graphite Paint, Black Lead Facings, Core Wash, and Graphite for electrolyzers.

LUBRICATING OILS.

A few years ago the writer saw hanging up in a prominent position in the office of a large manufacturing establishment, a base-ball bat marked, "For Oil Agents." This rather implied that oil salesmen were considered a nuisance, in that particular establishment at least (but the club did not look as though it had been used very much).

The fact is generally conceded that there is more "Humbug" in the oil business than in any other. A short time ago a party who had been in the oil business a number of years, approached us with a view to selling us his "Receipts" for making oil. He claimed that he could buy two different grades or brands of oils; one at 39 cents, and the other at 16 cents per gallon, and by mixing them in certain proportions, could produce a Cylinder Oil that could be sold by the barrel at 80 cents per gallon (he did not say how much lying or "oily" talk was necessary to make the sale, however).

We firmly believe that a very large proportion of the oil business of this country is done on the above basis.

Several years ago we came to the conclusion that a necessary part of our business was the handling of Lubricating Oils, and as in all other lines, we determined, if possible, to have the best. The first thing necessary was to select a house to purchase from that was both honest and intelligent, and to get rid of the vast horde of oil houses soliciting our trade.

Upon going into the matter carefully, we found that, in our best judgment, there were no more than five such houses. The three largest and best known being The Vacuum Oil Co., Leonard & Ellis, and E. F. Houghton & Co. All three of these concerns, we believe, have made it a rule to sell only to the consumer, and refuse to sell dealers at any price, for the reason that they wish to guarantee their oils going into the hands of the consumer, free from any adulteration, and at a fair price.

A very large percentage of oils are sold under fancy brands, and the consumer, if he is buying of a dealer, and not of the manufacturer, as is most often the case, is never assured of the fact that he is going to get the same oil every time.

The goods manufactured by the three

concerns named here can always be depended upon as being not only of the best quality, but *alike* in quality.

We sell the Oils made by E. F. Houghton & Co., of Philadelphia. Our attention was first called to these goods by the Brown & Sharpe Mfg. Co., who referred us to them. The B. & S. Co. have used their oils for years, and recommend them highly.

When we first approached the Houghton Co. they refused to consider us, as we were dealers; but when we frankly stated to them our position, and our desire to handle a line of only the best goods, they appointed us agents, under the condition that we handle no other oils save those made by them, a condition which we cheerfully agreed to, as we felt convinced that they could do better for both ourselves and our customers, quality and price considered, than any one else.

In this connection, we would say, that we have used in our own works for the past four years, the Cosmolubric No. 2, the Motoline Vim Cylinder, and Screw-Cutting Oils, and we know, by actual experience, whereof we write. We have run our main line shaft, using the American Hangers, shown on page 352, for one year and four months, with one filling of Cosmolubric No. 2.

To those who are interested—and there ought to be thousands—we will gladly send a little book entitled, "How to Buy Lubricating Oils." This book is valuable for the information it gives on this subject.

ENGINE AND MACHINERY OILS.

The Oils which have given the best satisfaction for engine lubrication are the Cosmolubric Oils. These Oils are of a bright claret color, their color having been obtained by filtration through bone black, by a process known as the Cosmoline process. Years ago these oils were called "Cosmoline Oils," but the name was changed to Cosmolubric, in order to avoid confusion with a medicinal preparation, also called Cosmoline.

COSMOLUBRIC, NO. 2. *Price, 60c gal.

This Oil has a reputation second to none, and has done more toward convincing intelligent people of the economy of

*Prices given are by the Bbl.; for lesser quantities add 3 cts. per gallon and cost of can.

using a high-grade oil than probably any other oil made—an oil which has been extensively used for twenty years in this country and Europe, and taken first awards in all competitive tests. We will guarantee this oil equal to the very best engine oil ever used, and feel confident that it will be found superior.

COSMOLUBRIC NO. 5. *Price, 43c gal..

A high-grade oil in every particular. Made on the same basis as the Cosmolubric No. 2, but designed for the lubrication of lighter machinery.

RED-LETTER OILS.

The Red-Letter Oils are not, strictly speaking, high-grade oils; neither are they the low-grade oils usually offered at these prices. We sell them because we have for our high-grade cylinder oils a large trade who prefer cheaper oils for general lubrication.

RED-LETTER "A." *Price, 23c gal.

A heavy boiled oil, especially adapted to the lubrication of general machinery, in warm climates and in high temperatures. Many parties use the Red-Letter "A" in summer-time, and the Red-Letter "P" in winter-time.

RED-LETTER "P." *Price, 25c gal.

An oil similar to the "A," but not quite so heavy in body.

CYLINDER OILS.

MOTOLINE VIM CYLINDER OIL.

*Price, 60c gal.

This is the oil which gives the best general satisfaction, and the one of which we sell the greatest quantity. It is of a rich claret color, good body and absolutely clean. It feeds perfectly in any of the standard lubricators. It is recommended by many of the leading engine builders, and used by a very large number of them in making trial tests of engines, where it is necessary to have the very best cylinder oil.

700 VIM CYLINDER OIL. *Price, 35c gal.

This oil is made to sell at 35 cents per gallon. It possesses no particular merit if you take quality into strict consideration, and we do not recommend its use. Unlike most cylinder oils which are sold at this price, this oil is not made from a waste product, but from a fair stock. In the manufacture of this oil those expensive details and processes are omitted

which increase the cost of a strictly high-grade oil.

There is no better demonstration of the assertion that you cannot judge the real qualities of an oil by its theoretical tests, than this oil, for its theoretical tests will all compare very favorably with the very best brands of cylinder oil on the market, yet in actual working it will be found to compare unfavorably with the best brands. It has a flash test of 485 degrees Fah.; fire test of 560 degrees Fah.; Baume gravity of 28 degrees, and cold test of 45 to 50 degrees Fah.

We trust that our frankness in admitting the defects of this oil will not prejudice anyone against its real quality. It should not be compared with the common trash usually sold at from 25 to 40 cents per gallon, and will be found superior to such oils in every respect. We will *guarantee* it to be better than any other oil sold for the same money, and will send a trial barrel to anyone subject to this guarantee.

DYNAMO OILS.

ELECTRIC VIM. *Price, 48c gal.

This oil should be used upon dynamos and machinery run at a very high rate of speed, where the oil is fed very freely, and where it is necessary to have a very fluid oil to answer the purpose.

RED-LETTER "H." *Price, 30c gal.

This is an excellent lubricating oil for dynamos. It has been adopted in a large number of plants where they have refused to believe that it is economical to use the higher-priced oils. It is not a low grade oil by any means. The price, 30 cents, we merely set as a price which could be obtained, and then, the very best oil was made which could be produced for the money, and it really is a very fair oil.

OILS FOR WESTINGHOUSE ENGINES.

E. F. Houghton & Co., make a specialty of both Cylinder and Crank-Case Oil for Westinghouse Engines, and to any of our readers who are using engines of this type, we will be pleased to mail circulars that treat of these oils in a very intelligent and interesting way. They are short and sweet, and will prove of great interest to those using Westinghouse Engines (no others need apply).

*Prices given are by the Bbl; for lesser quantities add 3 cts. per gallon and cost of can.

LUBRICATING OILS—Continued.

SLUSHING OIL.

COSMOLUBRIC NO. 1, 75 L. *Price, 60c gal.

An Oil expressly manufactured for slushing purposes, and used by most of the leading manufacturers of bright polished metal work in the country. It is a non-oxidizable protection for oxidizable surfaces, and will not in itself stain or in any way injure the parts to which it is applied. It is easily applied with a sponge or brush, and is easily removed.

The Oils described in the foregoing pages are such as we most commonly sell. Houghton & Co. make a large variety of oils both for regular and special use, besides these, and the book which we mentioned on page 303, "How to Buy Lubricating Oils" (sent free upon application) contains much valuable matter regarding these other oils.

Among other oils referred to are three brands of Cylinder oils, three of Cosmolubric oils, and three of Red-Letter oils, as well as an Extra Stainless oil used in knitting mills, silk mills, shirt and collar manufactories, etc., etc.; also two grades of Screw Cutting oil, and Cosmic Counter-Corrosive; this last being a heavy grease possessing the peculiar properties of adhering to a metal surface and preventing rust; it is a direct substitute for white lead and tallow, and has many advantages: the first being the cost; second, the ease with which it is applied; third, the ease with which it can be removed.

There are three varieties of Cosmics:

No. 80, Soft, melting at about 80 degrees Fahr.; is suitable for small tools, cutlery, etc., which are intended to be packed in boxes;

No. 95, Medium, melting at about 95 degrees Fahr.;

No. 110, Dense, melting at about 110 degrees Fahr.; forms the thickest coating, and adheres to very large machinery not otherwise protected, but exposed to the air, especially in hot climates or temperature, during transportation.

In	5 lb. cans,	28 cents per pound.
"	25 " "	23 " " "
"	50 " "	24 " " "
"	100 " "	22 " " "
"	350 " casks,	15 " " "

*Prices given are by the Bbl.; for lesser quantities add 3 cts per gallon and cost of can.

LUBRICATING GREASES.

For Grease Cups, see page 297.

The use of Lubricating Greases, commonly known as "Dope" or "Solid Oils," has increased very largely within the past few years. Good authorities claim that the best and cheapest lubricant is a first-class oil, but greases are so much more convenient to use, and so much less liable to be wasted, that many parties prefer them.

All lubricating greases are made by treating an animal product with an alkali, and, after boiling the emulsion down, adding thereto a certain percentage of mineral oil. The quality of the grease depends largely upon the quality and quantity of the mineral oil used. Science teaches that the most economical lubricant is that which possesses the greatest fluidity consistent with the use to which it is to be put, and the superior quality of the Houghton Lubricating Greases is due to the fact, that they possess as many of the properties of an oil as it is possible to introduce into a grease.

We can furnish several grades (in consistency) of lubricating greases, but we sell for general purposes almost entirely what is known as the No. 3 Lubricant. This is used for general machinery, and is usually fed through compression cups, as shown in Figs. 1068 and 1069.

The No. 2 Lubricant is thinner, used principally for light machinery, and is generally fed through a thin, funnel-shaped cup, which has a copper spindle running through the center.

No. 4 is a very heavy grade, and is fed principally in open boxes, but is also used in compression cups where the No. 3 is not considered heavy enough.

These Greases are put up in 5, 10 and 25 lb. tins, $\frac{1}{2}$ barrels (about 175 lbs.), and barrels of about 360 lbs. Price, in tins, 15 cents per lb.; in $\frac{1}{2}$ bbls. and bbls., 19 cents per lb.

"HELMET" BRAND SOLID OIL.

This is a Lubricating Grease that has a great reputation in many parts of the country, and is very largely sold. We believe it is imported. It comes in 1, 5 and 10 lb. cans, and 28 and 60 lb. pails.

Prices are as follows:

1 lb.	5 lbs.	10 lbs.	28 lbs.	60 lbs.
\$0.40	1.80	3.40	8.96	18.72

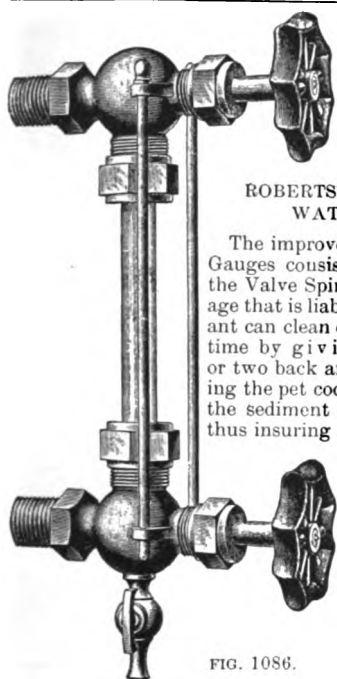


FIG. 1086.

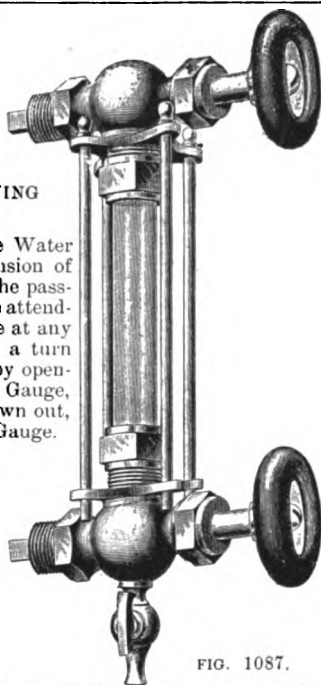


FIG. 1087.

ROBERTS' SELF CLEANING WATER GAUGES.

The improvement in these Water Gauges consists in an extension of the Valve Spindle through the passage that is liable to clog. The attendant can clean out the passage at any time by giving the wheel a turn or two back and forth. and by opening the pet cock at bottom of Gauge, the sediment will be all blown out, thus insuring a Safe Water Gauge.

The Bronzed and Polished Water Gauges are the same, excepting that the body of the first named is not finished; all the trimmings on both kinds are highly polished and finished. All numbers from 000 to 3 inclusive, have two guards, as shown in Fig. 1086; all other numbers have four guards, as shown in Fig. 1087.

No. 000, \$1.35, bronzed, round body, iron wheel. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 8 or 10 inches.

No. 00, \$1.60, same as No. 000, but polished and has wood wheels.

No. 1, \$1.50, Fig. 1086, bronzed, round body, iron wheel. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 12 inches.

No. 2, \$1.75, same as No. 1, but polished.

No. 3, \$2.10, same as No. 1, but polished, and has wood wheels.

No. 4, \$2.25, polished, round body, iron wheels. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 12 inches.

No. 5, \$2.60, Fig. 1087, same as No. 4, but with wood wheels.

No. 6, \$2.60, polished, round body, iron wheels. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 16 inches.

No. 7, \$3.00, same as No. 6, but with wood wheels.

No. 8, \$2.60, polished, square body, iron wheels. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 12 inches.

No. 9, \$3.00, same as No. 8, but with wood wheels.

No. 10, \$5.00, polished, square body, extra heavy, wood wheels, lever handle, pet cock. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 16 inches.

We can furnish the Nos. 9 and 10 with finished brass wheels in place of the wood wheels, at an extra cost of 35 cents.

No. 11, \$10.00, round body, polished, brass wheels. Boiler connection, $\frac{1}{2}$ inch; glass, $\frac{1}{2}$ x 16 inches.

This is a very elaborate, extra heavy gauge, intended for use where a hand some and first-class gauge is desired.

We can furnish extra brass Guards for Water Gauges at the following prices:

Length,	12	14	16	18	20 in.
Each,	\$0.09	.10	.12	.15	.20

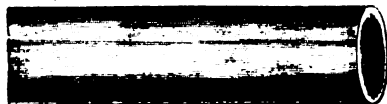


FIG. 1088. WATER GAUGE GLASS.

We handle only the genuine Perth (Scotch) Water Gauge Glasses, made by Moncrieff. These Glasses are the strongest and clearest in the market.

Outside Diameter.

Lgth. Inches.	1-2 and 5-8 inch.		8-4 inch.	
	Each.	Dozen.	Each.	Dozen.
10	\$0.12	\$1.20	\$0.18	\$1.65
11	.12	1.20	.18	1.65
12	.14	1.35	.18	1.65
13	.14	1.35	.18	1.65
14	.15	1.50	.20	1.80
15	.17	1.65	.20	1.80
16	.20	1.80	.20	1.95
18	.25	2.52	.27	2.70
20	.38	3.84	.40	4.08
24	.48	4.80	.50	5.04
30	.80	8.00	1.00	10.00
36	1.00	10.00	1.25	12.50



FIG. 1089.

RUBBER
GAUGE GLASS WASHERS.

Size,	1/2	3/4	1 in.
Each,	\$0.02	\$0.03	\$0.03
Dozen,	.20	.25	.30



FIG. 1090. GLASS TUBE CUTTER.

Price, 35 cts.; postage, 5 cts.

This is a low priced, simple and effective tool. There are a number of such devices on the market, at prices ranging from \$1.50 to \$2.50, but we do not think they are worth the difference in price.

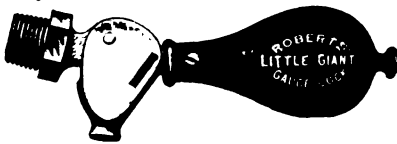


FIG. 1091. GAUGE COCK.

These Gauge Cocks are made of polished brass, with Japanned weight.
Price, 1/2 or 3/4 inch, 50 cts.; 1 inch, 55 cts.

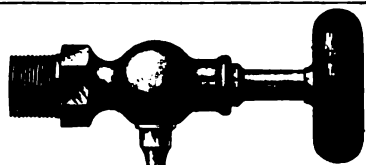


FIG. 1092.

ROBERTS' SYPHON
COMPRESSION
GAUGE COCK.

This Gauge Cock has some important improvements over the ordinary style; are highly finished, extra heavy, and have soft metal seats and Wood Wheels.

Size,	1/2	3/4	1 inch.
Price,	\$0.50	\$0.60	\$0.70

ROBERTS'
AUTOMATIC
SAFETY
HIGH



PRESSURE GAUGE COCK. FIG. 1093.

In placing the Victor Gauge Cock on the market we fully realize the difficulty of producing a satisfactory gauge cock for very high pressures and the severe conditions under which they are used. However, the construction of this one is such that we feel confident it will fulfil the mission for which it is intended; it is made of good steam metal, extra heavy, to ensure a tight gauge. A soft metal, or vulcanized disc is used, which can be replaced under full pressure, as, when the spindles are removed, the automatic valve closes the opening to boiler. The diaphragm through the bowl with outlets on each side forms a syphon which drains any steam or water that may escape into the second chamber, out through the nozzle, preventing any escape. As the valve is forced to a seat with a screw and lever, there is scarcely a limit to the pressure it will stand, and it will certainly stand any pressure that is being used. It is especially designed for steamships, electric light plants, or wherever a durable, clean and tight gauge cock is desired.

These Cocks are furnished threaded for either 1/2 or 3/4 inch pipe size.

Price, with Japanned Iron weight,	\$3.00
" " Polished Brass	4.00

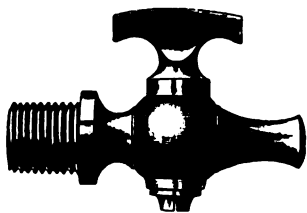


FIG. 1094. BRASS AIR COCK. *

$\frac{1}{8}$	Pipe size ;	Finished, each,	\$0.20
$\frac{1}{8}$	" "	Rough, "	.18
$\frac{1}{4}$	" "	Finished, "	.23
$\frac{1}{4}$	" "	Rough, "	.20

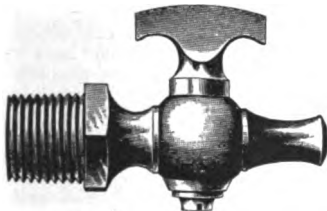


FIG. 1095. BRASS AIR COCK. *

The $\frac{1}{8}$ and $\frac{1}{4}$ inch sizes are made as shown in cut, with hexagon shank.

$\frac{1}{8}$	Pipe size ;	Finished, each,	\$0.25
$\frac{1}{8}$	" "	Rough, "	.22
$\frac{1}{4}$	" "	Finished, "	.30
$\frac{1}{4}$	" "	Rough, "	.27

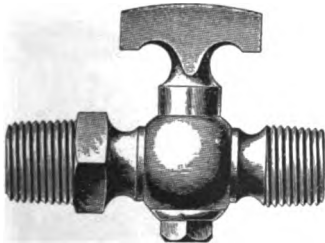


FIG. 1096. BRASS AIR COCK.

$\frac{1}{8}$	Pipe size ;	Finished, each,	\$0.23
$\frac{1}{8}$	" "	Rough, "	.20
$\frac{1}{4}$	" "	Finished, "	.25
$\frac{1}{4}$	" "	Rough, "	.22
$\frac{1}{2}$	" "	Finished, "	.30
$\frac{1}{2}$	" "	Rough, "	.27

*Any of these Air Cocks will be furnished with Lever Handles when desired, at an additional cost of 8 cents each.

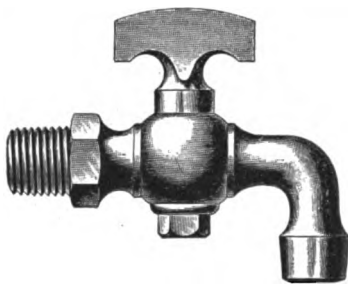


FIG. 1097. BIBB AIR COCK.

$\frac{1}{8}$	Pipe size ;	Finished, each,	\$0.33
$\frac{1}{8}$	" "	" "	.35
$\frac{1}{4}$	" "	" "	.38

The above prices are for Single Thread; if Double Thread, add 5 cents each.

RADIATOR COCKS.

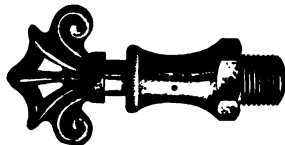


FIG. 1098. No. 1, Keyed, 15 cts. each.

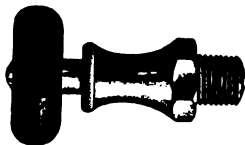


FIG. 1099. No. 2, Wood Knob, 19c each.

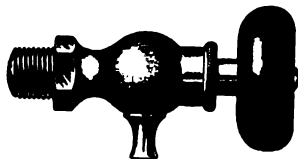


FIG. 1100. No. 3, Wood Knob, 25c each.

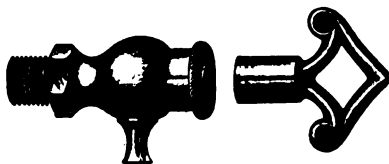
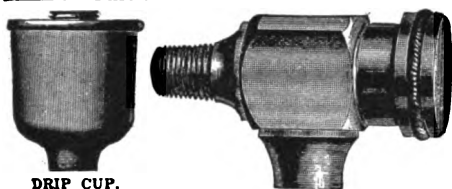


FIG. 1101. No. 4, Keyed. 21 cts. each.



DRIP CUP.

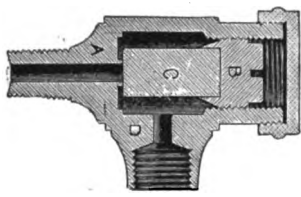


FIG. 1102.

JENKINS' AUTOMATIC AIR VALVE.

These Valves are suitable for high or low pressure, and are endorsed by the leading steam experts as the best made and quickest working Air Valves in the market. There are over two hundred thousand of them in satisfactory use. They are nicely finished and nickel-plated.

Price, each, 70 cts.; per dozen, \$7.50. Drip Cups, each, 20 cts.; per dozen, \$2.00.

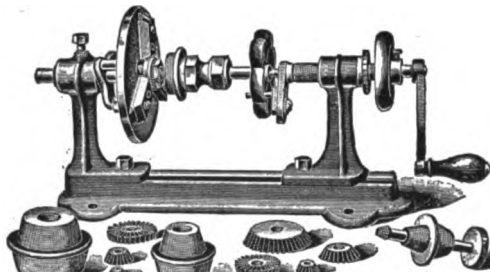
VALVE RE-SEATING MACHINES.

FIG. 1103. COMPLETE MACHINE.

This cut shows a No. 2 Combined Machine with all its parts, with a Valve Stem inserted ready to cut and burnish the disc. With these machines, old Valves can be resealed and made as good as new, and the process can be repeated six or eight times. They require no Lathe, Emery, or Experts.

The "New Standard" combines two machines in one; one part being used to

cut and burnish the seat of the valve, the other the stem or disc.

In shops and institutions where large numbers of valves are used, this machine will pay for itself in a very short time, by saving the expense entailed by loss of steam, and the cost in labor, damage and delay caused by disconnecting valves from the pipes for repair.

The Machines shown in Figs. 1103 and 1104 can be used for ordinary valves, Jenkins' or flat valves, and Check valves. It takes flat valves one size less than taper valves on each machine below No. 4.

No.	Price.	Valves, inches.	Sizes.
1 $\frac{1}{2}$	\$30.00	$\frac{1}{2}$ to 1 $\frac{1}{2}$	7
2	35.00	$\frac{1}{2}$ to 2	8
2 $\frac{1}{2}$	40.00	$\frac{1}{2}$ to 2 $\frac{1}{2}$	9
3	50.00	$\frac{1}{2}$ to 3	10
4	62.00	$\frac{1}{2}$ to 4	12
5	75.00	$\frac{1}{2}$ to 5	13
6	90.00	$\frac{1}{2}$ to 6	14



FIG. 1104.



FIG. 1105. FOR DISC VALVES.

Fig. 1105 shows the machine for refitting flat seated or disc valves.

No.	Price.	Valves, inches.	Sizes.
1	\$7.00	$\frac{1}{2}$ to 1	5
1 $\frac{1}{2}$	9.50	$\frac{1}{2}$ to 1 $\frac{1}{2}$	7
2	12.50	$\frac{1}{2}$ to 2	8
2 $\frac{1}{2}$	14.50	$\frac{1}{2}$ to 2 $\frac{1}{2}$	9
3	18.50	$\frac{1}{2}$ to 3	10

VALVES.

Any one who is posted in regard to the Valve business, is aware of the fact that there are at least five poor, miserable, good-for-nothing Valves made to one good one; and they are not only made, but sold and used as well.

The introduction of Automatic Machinery and improved methods of manufacturing have reduced the price to such an extent, that good Valves are cheap enough in all conscience, and there is no excuse for using poor Valves. Consumers should always bear in mind the fact that it almost invariably costs more to replace a defective valve than it does to buy good ones, to say nothing of the annoyance and often great expense entailed by the use of poor valves.

There are, however, plenty of good valves in the market, and if the purchaser will take a little pains, he will have no difficulty in procuring them.

In selecting the line of Valves shown in this book, we have made an earnest effort to have only the goods that are made by representative manufacturers. We believe them to be the best in their various classes, and warrant them fully in every particular. All Valves shown here are made of the best steam metal, plenty of it, and the workmanship and finish are also of the best.

JENKINS BROS.' VALVES.

Do not accept any Valves, Dies, Pump Valves, or Packings as Jenkins' unless stamped with the trade mark.



fully acknowledged to be the best Valves ever made or put in use. The feature of this Valve is the Removable Disc. This Disc when worn out, or used up, may be removed without taking off the Valve, and a new one, costing but little, put in, thus making the valve practically new.

The main patent on the Jenkins' Valve expired several years ago, and since that time nearly all valve manufacturers make what is known as a Jenkins' Disc Valve,

The Jenkins' Valves have been on the market for over twenty years, and are gener-

ally which is an imitation or rather reproduction of the old style.



FIG. 1107.

LOCK NUT AND DISC.

the Disc, makes it impossible for the Nut to get off after being screwed down in place; and another great advantage is, that in removing the Disc, the Nut and Disc come off together.

The Keyed Stuffing Box (see Fig. 1108) is another feature found only in Jenkins Bros.' Valves. This is a Hexagon cast in the neck of the valve, in which the packing is compressed by the Stuffing Box Nut, and prevents the Packing and Nut from turning in opening and closing the valve, thus avoiding leakage from this cause. It cannot get out of order, as it is part of the valve.



FIG. 1108.

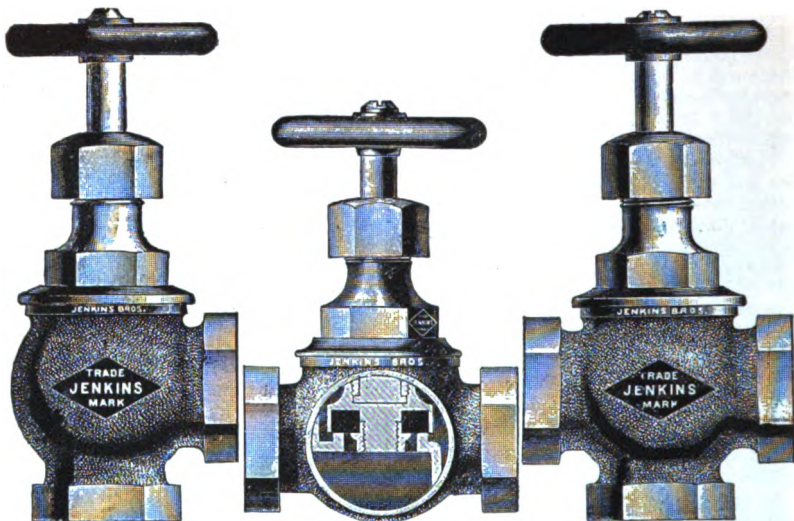
STUFFING BOX.

We believe that more than one-half of the orders sent to dealers specifying Jenkins' Valves, are filled with imitations; and consumers, in order to protect themselves, should specify Jenkins Bros. and accept no other make.

Jenkins Bros. have always printed in their catalogues the following offer:

"If you will put a Jenkins' Valve on the worst place you can find, where you cannot keep other valves tight, and if it is not perfectly tight, or does not hold Steam, Oils, Acids, Water or other fluids longer than any other valve, you may return it and your money will be refunded."

We have on our desk a 1 inch Angle Valve that was used on a job for which genuine Jenkins' Valves were specified. This valve, while made to go on 1 inch pipe, is no larger in the body or opening than a $\frac{1}{4}$ inch Jenkins Bros.' Valve. It weighs 36 oz., while the Jenkins Bros.' Valve, of same nominal size, weighs 53 oz.



ANGLE VALVE.

GLOBE VALVE.

CROSS VALVE.

FIG. 1109. JENKINS' STEAM METAL VALVES.



FIG. 1110.

IRON BODY ANGLE VALVE, FLANGED.

FIG. 1111.

IRON BODY GLOBE VALVE, SCREWED.

FOR PRICES OF JENKINS BROS.' VALVES SEE NEXT PAGE.

PRICES OF JENKINS BROS.' VALVES.

STEAM METAL GLOBE AND ANGLE VALVES.

Size, in.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2
Each,	\$0.55	.63	.80	1.10	1.40
Size, in.	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	
Each,	\$2.00	2.75	4.00	7.85	11.00

STEAM METAL CROSS VALVES.

Size, in.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2
Each,	\$0.85	1.00	1.12	1.25	1.63
Size, in.	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	
Each,	\$2.37	3.12	4.75	10.00	13.75

IRON BODY—COMPOSITION MOUNTED.

Figs. 1110 and 1111.

Size, in.	Globe and Angle with Yoke.		Cross Valves.	
	Screwed.	Flanged.	Screwed.	Flanged.
2	\$5.00	\$5.85		
2 $\frac{1}{2}$	6.00	7.00	\$8.00	\$9.50
3	8.85	9.25	10.50	12.00
3 $\frac{1}{2}$	9.75	10.75	13.00	14.50
4	12.00	13.00	15.00	16.50
5	20.00	21.00	22.50	24.00
6	24.00	25.00	29.00	31.00
7	40.00	40.00		
8	45.00	45.00		
10	65.00	65.00		
12	92.50	92.50		



FIG. 1112. HORIZONTAL CHECK VALVE.



FIG. 1113. ANGLE CHECK VALVE.

STEAM METAL CHECK VALVES.

The prices of these are the same for Horizontal, Angle and Vertical.

Size, in.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2
Each,	\$0.55	.60	.65	.95	1.30
Size, in.	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	
Each,	\$1.80	2.50	3.75	6.75	10.25

IRON BODY CHECK VALVES.

SCREWED.

Size,	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5	6
Each,	\$5.25	7.00	8.50	10.00	15.00	20.00

FLANGED.

Each,	\$6.25	8.25	10.00	11.50	16.50	21.50
Size,	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5	6

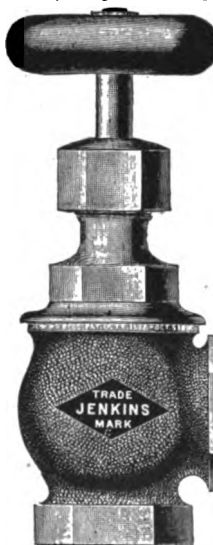


FIG. 1114. RADIATOR VALVE.

For Radiator work, there is no valve that equals the genuine Jenkins'. They have all the advantageous features of the regular Jenkins' valves, including the Patent Keyed Stuffing Box, which prevents the nut from coming off in opening and closing the valve, and the Disc removing Lock Nut. We furnish these in all sizes from $\frac{1}{2}$ to 2 inch, and in any finish. Catalogue will be sent upon application.



FIG. 1115.

JENKINS' DISC.

All Discs manufactured by Jenkins Bros., are stamped "Jenkins' Disc, pat. Oct. 5, 1880." The Jenkins' will stand steam, oil or acids. In ordering Valves or Discs for cold water, please specify

PRICE LIST OF JENKINS' DISCS.

Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2
Each,	\$0.03	.04	.04	.05	.06
Size,	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5
Each,	.24	.33	.45	.52	.68
Size,	6	8	10	12	14
Each,	.90	1.05	1.20	1.35	1.50

We can furnish special Discs to order, of any size or shape.

LUNKENHEIMER REGRINDING VALVES.

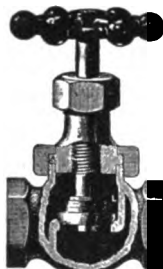


FIG. 1116.
REGRIND'G VALVE. most others.

These are heavy "Re-grinding" Valves, made from best steam metal, and we believe are the best valves of this class in the market. They are always easily taken apart, *having an outside thread* and union connection for holding the hub to the valve-shell, and the hub will not cement into the shell, as is the case with

STEAM METAL GLOBE AND ANGLE VALVES.

Size, in. $\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Each, \$0.35	.35	.43	.58	.73	1.00
Size, in. $1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	
Each, \$1.40	1.95	3.10	6.00	8.25	

FINISHED VALVES.

We can furnish the above Valves hand-somely finished and polished all over. These have brass wheel, and are used on model and fine work generally.

Size, in. $\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Each, \$0.88	.95	1.08	1.25	1.55	1.83
Size, in. $1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	
Each, \$2.63	3.63	5.38	11.00	16.75	

CROSS VALVES.

Size, in. $\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Each, \$0.50	.75	1.00	1.35	1.75
Size, in. $1\frac{1}{2}$	2	$2\frac{1}{2}$	3	
Each, \$2.55	4.00	8.00	12.00	



FIG. 1117. HORIZONTAL CHECK VALVE.

IMPROVED REGRINDING CHECK VALVES.

The Discs in these Valves are guided both top and bottom, and so constructed that they will always seat perfectly, and not leak, stick or pound; the action being quick and positive.

STEAM METAL CHECK VALVES.

HORIZONTAL, ANGULAR AND VERTICAL.

Size, in. $\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Each, \$0.25	.25	.30	.43	.58	.78
Size, in. $1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	
Each, \$1.15	1.63	2.60	5.00	7.00	

IRON BODY CHECK VALVE—GLOBE & ANGLE.

SCREWED.

Size, in. $2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
Each, \$2.50	3.90	5.10	6.00	9.60	13.20

FLANGED.

Size, in. $2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
Each, \$3.30	5.10	6.50	7.80	11.20	15.60

THE "LUNKEN" RENEWABLE SEAT GATE VALVE.

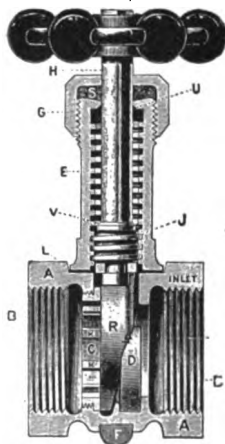


FIG. 1119. PLATE E. SEC'L.

C—Renewable Seat.
D—Self-Adjusting H.S. Wedge
F—Japanned Steel Band.
KK—Ribs on Renewable Seat.
L—Lead Packing. R—Disc.
S—Asbestos Packing.

The Seat and Disc of these Valves can be ground without disconnecting from pipes. The Disc is balanced, thus operating easily regardless of high pressure. Every valve is warranted to stand a working pressure of 150 lbs. to the square inch. The Quick Opening Valves, Fig. 1121, same price as regular style.



FIG. 1118.



FIG. 1120.

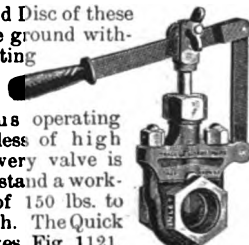


FIG. 1121.
QUICK OPEN'G.

LUNKEN GATE VALVES.**BRASS—SCREWED.**

Size,	$\frac{1}{2}$	1	1 $\frac{1}{2}$	2	3 inch
Each,	\$0.75	1.00	1.40	2.00	3.00

We can furnish both larger and smaller sizes if desired.

IRON BODY, BRASS MOUNTED—SCREWED.

Size,	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5	6 in.
Each,	\$4.80	6.00	7.20	8.30	12.80	16.00

Size,	7	8	9	10	12
Each,	\$22.40	28.00	32.80	40.00	56.00

IRON BODY, BRASS MOUNTED—FLANGED.

Size,	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5	6 in.
Each,	\$5.60	7.00	8.40	10.00	14.40	17.60

Size,	7	8	9	10	12 in.
Each,	\$24.40	30.00	34.80	42.40	58.40

Quick Opening Valves, Fig. 1121, same price.

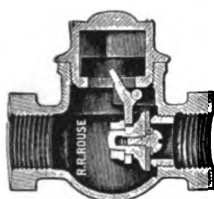
ROUSE SWING CHECK VALVE.

FIG. 1122.

justable seat that can be taken out and reground.

This Valve can be used as a vertical or horizontal check valve; has ground seat and clapper. Valve slips in at an opening in a slot or groove, and cannot get out of place; has an adjustable seat that can be taken out and reground.

BRASS, WITH SCREW ENDS.

Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$ in.
Each,	\$0.68	.85	1.10	1.60	2.10	3.10 5.75

We can also furnish the Rouse Swing Check Valve with Iron Body, brass-mounted, either Screwed or Flanged, from 2 $\frac{1}{2}$ to 6 in. Prices upon application.

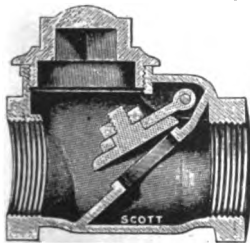


FIG. 1123. BEVEL SEAT CHECK VALVE.

The above represents the ordinary type of Swing-Check Valve. Prices and sizes are same as the Rouse Valve, Fig. 1122.

(20)

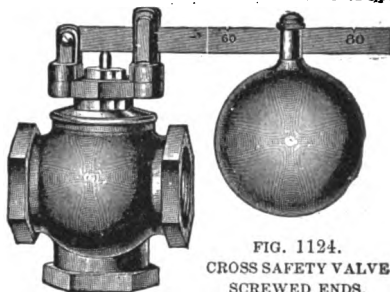


FIG. 1124.

**CROSS SAFETY VALVE
SCREWED ENDS.**

The prices of the Safety Valves include the weights.

BRASS CROSS SAFETY VALVE—SCREWED.

Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2 in.
Each,	\$1.00	1.25	1.60	2.25	3.15 3.85

IRON BODY CROSS SAFETY VALVE.

Size,	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3 in.
Screwed,	\$1.60	2.25	2.70	3.60	5.85

Flanged,				4.75	7.20
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Size,	3	3 $\frac{1}{2}$	4	5	6 in.
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Screwed,	\$8.10	10.80	13.50	19.80	27.00
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Flanged,	10.10	13.25	16.20	22.50	30.35
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IRON BODY, TOP OUTLET SAFETY VALVE.

Size,	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3 in.
Each,	\$1.60	2.25	2.70	3.60	5.85 8.10

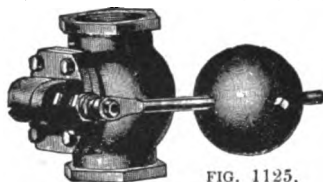


FIG. 1125.

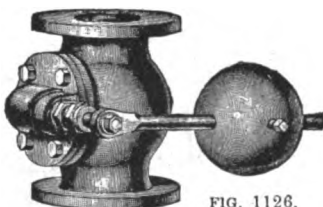
BACK PRESSURE VALVE—SCREWED.

FIG. 1126.

BACK PRESSURE VALVE—FLANGED.

Size,	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4 in.
Scr'd,	\$3.00	\$3.20	\$4.20	\$5.80	\$7.20	\$8.40

Flg'd,	3.40	4.00	5.00	7.00	8.60	10.00
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Size,	5	6	7	8	10	12 in.
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Scr'd	\$12.80	17.60	30.00	34.00	54.00	80.00
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Flg'd,	14.40	19.60	32.00	36.40	58.00	88.00
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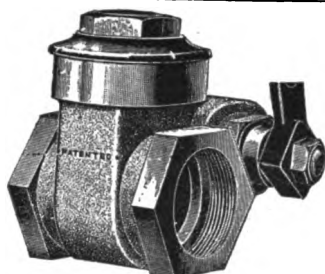


FIG. 1127. LEVER THROTTLE VALVE.

This Valve is especially adapted as a "Throttle" for Traction, Hoisting and Yacht Engines, Steam Shovels, Saw Mills, Pile Drivers, Steam Hammers, and wherever a compact, simple, durable and reliable Quick-Opening valve is wanted. It may be operated by the handle or rod attachment, and can be set at any desired degree of opening. These valves are also suitable for other steam purposes instead of Globe valves, the lever movement being very convenient, and indicating the exact opening of the valve.

BRASS BODY.

Size, $\frac{1}{2}$ 1 $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$ in.
Price, \$1.80 2.40 3.00 4.20 6.00 11.40

IRON BODY.

Size, $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4 5 6
Price, \$9.60 12.00 15.00 18.00 21.00 24.00

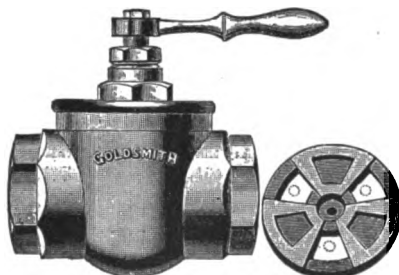


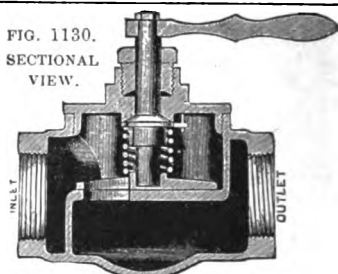
FIG. 1128.

GOLDSMITH'S STRAIGHT-WAY
THROTTLE VALVE.

FIG. 1129.

FACE OF
VALVE.

These Valves are intended for Stationary, Marine and Portable Engines, Steam Pumps, Forge Hammers, Riveters, Hoisting Engines, etc., etc. They are very effective, and simple in operation.

FIG. 1130.
SECTIONAL
VIEW.

BRASS, WITH SCREW ENDS.

Either Angle or Straight-way.

Size, $\frac{1}{2}$ 1 $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$ 3 in.
Ea., \$2.40 3.60 4.80 6.00 9.60 15.60 24.60

We can also furnish the Goldsmith valve with Flange ends, and with Iron Body both Screw and Flange ends, from 2 to 7 inches. Dimensions and prices upon application.

IMPROVED POP SAFETY VALVE. FIG. 1131.

ALL BRASS.

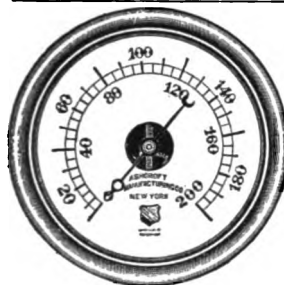
These Valves are used on Stationary, Portable and Marine Steam Boilers. They are warranted reliable, accurate, and of superior quality, have full relieving capacity and are very sensitive. All valves are provided with a lock-key attachment to guard against being tampered with, and are carefully tested.

Are also made with "Side Outlet" for pipe connections to carry off

steam. In ordering Pop Valves, always state at what pressure the valve is to blow off. Unless otherwise specified, Top Outlet Pop Valve will be sent set at 100 lbs.



Size	Top	H. P.	Size	Top	H. P.
Pipe or Side	of	of	Pipe	of	of
In.	Outlet.	Boiler.	In.	Outlet.	Boiler.
$\frac{1}{2}$	\$3.60	3	$1\frac{1}{2}$	\$5.75	20
$\frac{3}{4}$	4.00	5	2	9.00	30
$\frac{1}{2}$	4.25	8	$2\frac{1}{2}$	14.00	60-75
1	4.50	10	3	19.00	75-100
$1\frac{1}{2}$	4.75	15			

FIG. 1132.
IRON CASE,
JAPANNED.

The prices given here include Cocks and are for Gauges up to 300 lbs. pressure.

Size, 3 $\frac{1}{4}$ 5 5 $\frac{1}{2}$ 6 6 $\frac{1}{2}$ 8 $\frac{1}{2}$
Each, \$2.95 2.50 2.75 6.00 8.00 11.00

We can furnish Gauges of almost any variety or style, including Standard Test, Ammonia, Hydraulic, Locomotive, Water Pressure, etc., etc.

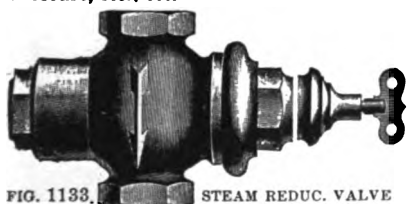


FIG. 1133. STEAM REDUC. VALVE

The Mason Steam Reducing Valve, Fig. 1133, is designed to reduce and maintain an even steam or air pressure regardless of the initial pressure. It will automatically reduce boiler pressure for steam heating coils, dry-rooms, and all places where it is desirable to use lower pressure than that of the boiler. These Valves will maintain an even steam or air pressure as low as 1 lb. if necessary

Size, 1 1 $\frac{1}{2}$ 2
Each, \$15.30 18.70 23.80 29.75 37.40
Size, 2 $\frac{1}{2}$ 3 3 $\frac{1}{2}$ 4 5
Each, \$48.45 61.20 72.25 85.00 114.75

The Mason Water Reducing Valve is designed to reduce the water pressure from the street water-mains to a low pressure for houses and buildings. The prices on these are ten per cent less than on the Steam Reducing Valves.

Can also furnish the following devices made by the Mason Regulator Co.:

MASON PUMP GOVERNOR,
MASON PUMP PRESSURE REGULATOR,
MASON BALANCED VALVE,
MASON STEAM DAMPER REGULATOR.

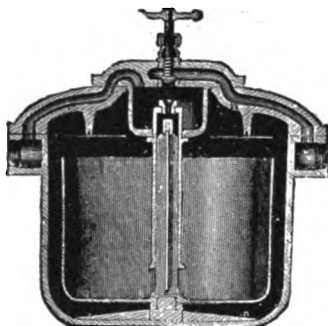


FIG. 1134. NASON STEAM TRAP.

For taking off the water of condensation from steam pipes, coils and apparatus employed in steam heating and evaporating. Where pressures exceeding 80 lbs. are to be used, or if the pressure is always less than 30 lbs., please advise us so that the Traps may be fitted to their particular work.

No.	1	2	3	4	5
Each,	\$8.80	11.00	15.15	23.40	38.50
Pipe Con.	$\frac{1}{2}$	$\frac{1}{2}$	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$

The following table gives the greatest number of square feet of surface, and greatest number of lineal feet of 1 inch pipe surface to which the various sizes should be applied:

No.	1	2	3	4	5
1 in. Pipe,	1050	2700	4200	6000	10500
Square ft.	350	900	1400	2000	3500

MECHANICAL BOOKS.

The following list of Books are published by the Mason Regulator Co. They are written by the best authorities on the subjects treated, in clear and concise language, and are offered at very reasonable prices. Any one of these will be sent post-paid upon receipt of price:

No. 1—Key to Engineering, by W. R. Bailey; 92 pages, price 30 cents.

No. 2—Common Sense in Making and Using Steam; 60 pages, 25 cents.

No. 3—The Engineers' Epitome, by N. J. Smith; 135 pages, 50 cents.

No. 4—What an Engineer Should Know About Electricity, by Albert L. Clough; 110 pages, 50 cents.

No. 5—Key to Engineering (third edition enlarged); 174 pages, 50 cents.

No. 6—Engineers' Catechism, by F. L. Fowler; 133 pages, 25 cents.

STEAM WHISTLES

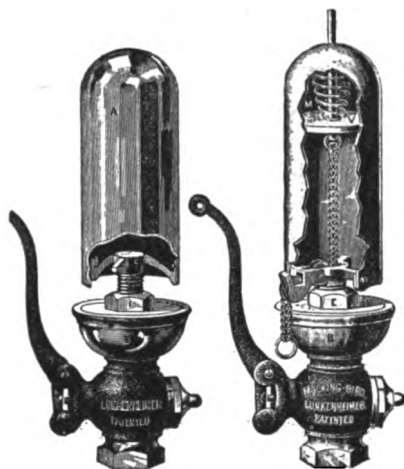


FIG. 1135.

ALL BRASS.
ADJUSTABLE LEVER.

FIG. 1136.

MOCKING BIRD
WHISTLE.

Fig. 1135 represents an improved Steam Whistle of the ordinary type; it has several practical advantages; is simple and neat in appearance.

PRICES OF FIG. 1135.

Diam. of Bell,	1	1½	2	2½	3
Pipe Connec'n,	½	¾	1	1½	2
With Adj. Lev.	\$1.75	2.00	2.40	3.25	4.00
Without Valve,	.85	1.25	1.65	2.25	3.00
Diam. of Bell,	3½	4	5	6	8
Pipe Connec'n,	1	1½	1½	1½	2
With Adj. Lev.	\$5.50	7.00	11.00	15.00	40.00
Without Valve,	4.25	5.50	9.00	12.00	32.50

Fig. 1136 represents a patent Piston or Mocking-Bird Whistle. A "Variable" sound steam whistle, especially adapted for traction engines, steam-boats, factory and mill use. It is especially useful as a fire alarm. When the Piston is not operated the whistle gives but one sound, like any ordinary whistle, but when pulled up and down, a howling, penetrating noise is produced.

PRICES OF FIG. 1136.

Diam. of Bell,	2½	3	4	5
Pipe Connec'n,	¾	1	1½	1½
With Valve, &	5.25	7.00	14.00	30.00
Without	4.50	6.00	12.50	18.50

Larger sizes furnished when desired.

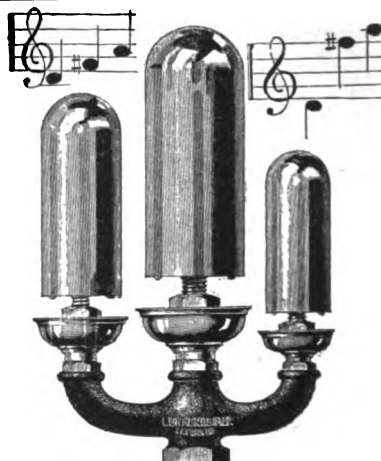


FIG. 1137. THREE-WHISTLE CHIME.

These Chime Whistles are composed of three whistles of the same style as shown in Fig. 1135, and are correctly tuned.

No. 1, \$12.10; with Valve, \$13.75; one each, 1½, 2 and 2½ inch whistles. Pipe connection, 1 inch.

No. 2, \$22.00; with Valve, \$24.75; one each, 3½, 4 and 5 inch whistles. Pipe connection, 1½ inches.

Larger sizes furnished when desired.

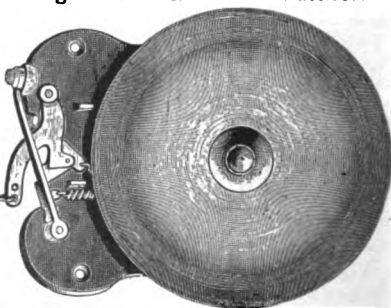


FIG. 1138. LOCOMOTIVE GONG BELL.

This is a Central Pull, Outside Trip Gong, adapted for use in factories, elevators, mines, etc. All Bells 10 inches and larger have Lignumvitæ wood hammers.

Diam., 5 in.	6 in.	7 in.	8 in.
Each, \$1.25	1.75	2.50	3.00
Diam, 10 in.	12 in.	14 in.	16 in.
Each, \$4.75	8.50	11.25	14.75

SAFETY WATER COLUMN.

The sole object of the Safety Water Column is to cause the water in steam boilers to be carried uniformly at the proper level. The accomplishment of this result means not only safety for life and property, but economy of fuel and repairs, and longer life for the boilers.

There are a number of different styles of Water Columns, but the Reliance Safety Column has advantages over all others, and is generally conceded to be the best.

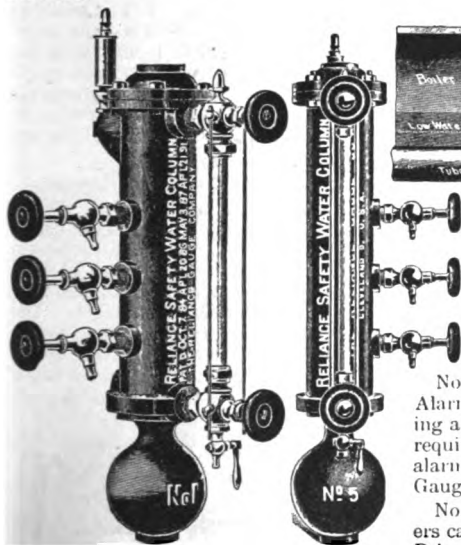


FIG. 1139.

FIG. 1140.

RELIANCE SAFETY WATER COLUMNS.

No. 1, combined High and Low Water Alarm for boilers carrying not greater than 80 lbs. steam pressure, and not requiring greater than six inch variation between the alarms. Price, \$22.40.

With polished Brass Water Gauge and Gauge Cocks, \$28.00.

No. 1½, combined High and Low Water Alarm for boilers carrying any ordinary steam pressure. Prices same as No. 1.

No. 2, Low Water Alarm only, for boilers carrying not more than 100 lbs. steam pressure; otherwise exactly like No. 1. Price, \$20.00; with Polished Brass Water Gauge and Gauge Cocks, \$25.60.

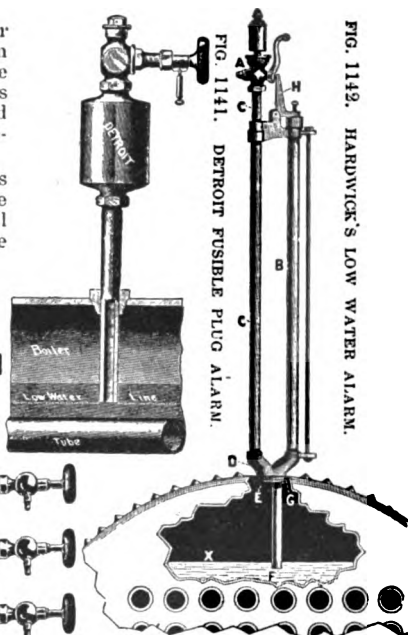


FIG. 1141. DETROIT FUSIBLE PLUG ALARM.

FIG. 1142. HARDWICK'S LOW WATER ALARM.

No. 5, combined High and Low Water Alarm for boilers of large diameter carrying any ordinary steam pressure, and not requiring over 8 inches variation between alarms. Price, \$24.00; with Gauge and Gauge Cocks, \$32.00.

No. 6, Low Water Alarm only, for boilers carrying any ordinary steam pressure. Price, \$22.40; with Water Gauge and Gauge Cocks, \$29.60.

Fig. 1139, No. 1, shows a left-hand Column; Fig. 1140, No. 5, a right-hand Column. In ordering please state which is preferred.

Fig. 1141 is a simple form of Fusible Plug Low Water Indicator. Price, \$5.75.

Fig. 1142 shows the Hardwick Automatic Low Water Alarm, which is briefly explained as follows: When the water gets below bottom of Pipe F, the steam rushes up into Copper Pipe B, causing it to expand and raising the Bell Crank H, blowing whistle A, which will continue to blow until the surface of water X raises above the bottom of Pipe F. Price, complete, \$9.75.

INJECTORS.

Injectors have become the most popular means employed for feeding boilers, and there are many different makes in the market.

There are two distinct types, the Automatic (usually a single jet apparatus), and the Positive or "Double Jet."

Of the former class, several are regarded as good, reliable devices; among these are the Metropolitan, Penberthy, American and the "U. S."

The "U. S.", which we illustrate in Fig. 1143 is one of the latest improved,

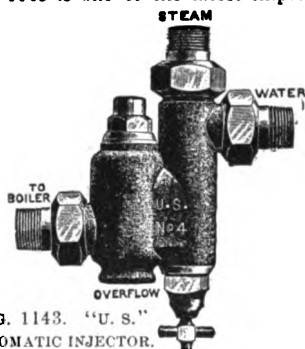


FIG. 1143. "U. S." AUTOMATIC INJECTOR.

and combines all desirable features in a single jet Injector; is adapted for the widest range of work possible for a single jet machine. It works on short lift, with steam pressure from 20 lbs. to 150 lbs.; on a 10 ft. lift, with steam from 30 to 125 lbs.; and on 20 ft. lift with steam from 50 to 75 lbs. Handles water on short lift at 108 degrees Fah. with 100 lbs. steam, or 110 degrees Fah. with 60 lbs. of steam.

This Injector is perfectly automatic, (that is to say, restarts upon return of water if stopped for want of water covering the lower end of suction pipe), never can blow back into the suction; will exhaust hot water from suction pipe; has a wide range of work, as above shown; is very simple in operation. The jets can be readily removed for cleaning, without disconnecting, and, we unhesitatingly recommend it for general use.

In the following table, the capacity as given is tested on a 4 ft. lift, with steam at 80 lbs. In ordering, always bear in mind that longer lift increases capacity.

No	Each.	All Pipe Con'ct'ns.	Capacity, Gals. per Hour.		Horse Power.
			Max.	Min.	
00	\$5.95	$\frac{1}{2}$	36	15	1 to 4
0	6.30	$\frac{3}{4}$	65	28	3 to 8
1	7.20	$\frac{1}{2}$	90	40	6 to 10
2	8.10	$\frac{1}{2}$	125	60	8 to 15
3	9.00	$\frac{1}{2}$	170	75	15 to 20
4	11.25	$\frac{1}{2}$	250	125	20 to 30
5	13.50	$\frac{1}{2}$	340	140	30 to 40
6	18.00	1	475	250	40 to 60
7	20.25	1	575	300	60 to 70
8	24.75	$1\frac{1}{2}$	750	350	70 to 95
9	27.00	$1\frac{1}{2}$	920	450	85 to 120
10	33.75	$1\frac{1}{2}$	1350	675	120 to 165
11	40.50	$1\frac{1}{2}$	1750	850	165 to 230
12	49.50	2	2275	1000	230 to 295
13	56.25	2	2820	1300	295 to 375
14	67.50	2	3400	1700	375 to 460
15	78.75	$2\frac{1}{2}$	3650	1800	460 to 500
16	90.00	$2\frac{1}{2}$	4000	1950	500 to 600

POSITIVE INJECTORS.

Of the second class named in first portion of this article, the Positive or Double Jet Injectors, there are several good, reliable makes. The Hancock Inspirator is of this class; is probably better known, and there are more of them in use than any other injector in the market. The Korting Universal is favorably known, and is one of the very best; this is operated by a single lever, and is most excellently made.

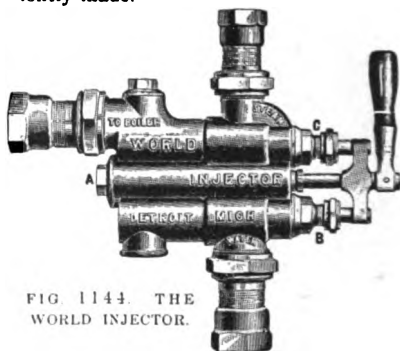


FIG. 1144. THE WORLD INJECTOR.

The World Injector, which we illustrate here, is one of the best in this class. Like the Korting, it is handled by one lever; is an excellent lifter; has a wide range of work; answers every practical purpose, and is sold at a considerably lower price than the Korting.

For prices, see next page.

PRICE LIST OF WORLD INJECTORS.

No.	Price.	Size of Connections, Suction & Delivery.	Size of Connections, Steam.	80 lbs. Steam Pres. Gal. per Hour.	Horse Power.
30	\$10.00	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	120	10 to 15
40	12.50	$\frac{3}{4}$ "	$\frac{3}{4}$ "	220	15 to 25
50	15.00	$\frac{1}{2}$ "	$\frac{1}{2}$ "	300	25 to 35
60	20.00	1 "	$\frac{3}{4}$ "	420	35 to 50
70	22.50	1 "	$\frac{1}{2}$ "	540	45 to 60
80	27.50	$1\frac{1}{2}$ "	1 "	720	60 to 95
90	30.00	$1\frac{1}{2}$ "	1 "	900	85 to 120
100	37.50	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	1260	120 to 165
110	45.00	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	1740	165 to 230
120	55.00	2 "	$1\frac{1}{2}$ "	2230	230 to 295
130	62.50	2 "	$1\frac{1}{2}$ "	2820	295 to 375
140	75.00	2 "	$1\frac{1}{2}$ "	3480	375 to 460
150	87.50	$2\frac{1}{2}$ "	2 "	3600	460 to 500
160	98.50	$2\frac{1}{2}$ "	2 "	4000	500 to 600

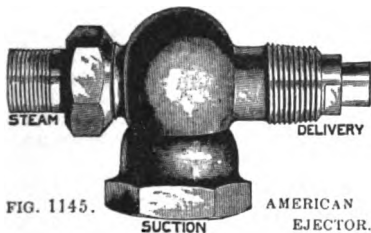


FIG. 1145.

AMERICAN EJECTOR.

These Ejectors are especially adapted for lifting and forcing water from a lower level to a great height. For instance, from pits, mines or quarries up to the surface, or to fill tanks at any great elevation above the water level.

With 20 lbs. of steam these Ejectors will lift water from a level 17 ft. below and force it to a height of 16 ft.; a total elevation of 33 ft.

With 40 lbs. of steam they will lift 23 ft. and force 39 ft.; total, 62 ft.

With 80 lbs. of steam they will lift 17 ft. and force 85 ft.; total, 102 ft.

No.	Price.	Size of Suction.	Size of Delivery.	Size of Steam Con'n.	Galls. per hr.
000	\$2.80	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	150
00	3.50	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "	250
0	4.20	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	375
1	5.25	1 "	$\frac{1}{2}$ "	$\frac{1}{2}$ "	500
2	7.00	$1\frac{1}{2}$ "	1 "	$\frac{1}{2}$ "	1000
3	8.75	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	1 "	1500
4	10.50	2 "	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	2000
5	12.25	$2\frac{1}{2}$ "	2 "	$1\frac{1}{2}$ "	2800
6	15.75	3 "	$2\frac{1}{2}$ "	2 "	3800
7	20.30	4 "	3 "	2 "	6500
8	25.50	5 "	4 "	$2\frac{1}{2}$ "	10000

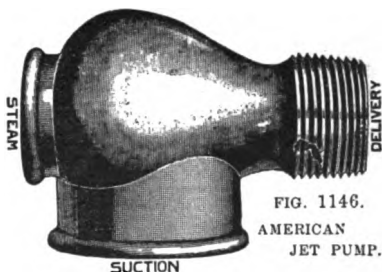


FIG. 1146.

AMERICAN JET PUMP.

The Jet Pumps are for filling tanks for farms or road engines; also for drainage pumps for steamboats, barges, mines, etc. Will draw the water from a level 10 to 15 ft. below, and discharge at a height about 1 ft. to each pound of steam pressure carried. They correspond in size to the American Ejector, Fig. 1145, and are one-half the price.



FIG. 1147.

AMERICAN FIRE PLUG.

The Fire Plug shown is a simple jet machine, intended as an inexpensive substitute for a Pony Pump or other fire extinguishing apparatus in and about mills, factories or steamboats, or any place where steam is used and something is desirable for quenching fires. It is a valuable adjunct in all cases, and is particularly convenient for farm engines (threshing, wood-sawing, etc.). They are compact, easily adjusted, and always ready when steam is in boiler.

These Fire Plugs will throw water from 40 to 90 ft. high, with from 40 to 90 lbs. of steam, where the level of the supply water is not over 10 ft. below the machine.

No.	Price.	Size of Suction.	Size of Delivery.	Size of Steam Con'n.	Galls. per hr.
1	\$10.00	1 inch	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch	600
2	12.50	$1\frac{1}{2}$ "	1 "	$\frac{1}{2}$ "	1000
3	15.00	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	1 "	1700
4	19.00	2 "	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	2500
5	24.00	$2\frac{1}{2}$ "	2 "	$1\frac{1}{2}$ "	3500

ENGINES.

When our business was established, years ago, our business card read, "Dealers in Tools, Hardware, Supplies and Light Machinery," and an inquiry for anything in the line of Engines, Boilers, etc., was referred elsewhere.

As our business assumed larger proportions, our inquiries for these goods became more numerous, and it was with a feeling of sadness that they were referred to the "other fellow," so we were forced, as a matter of necessity rather than of choice, into handling larger and heavier lines of Machinery and Supplies.

After having so decided, came the task of selecting a line in each class that was on a par with the other lines of goods we were handling.

The Engines selected, after thorough investigation, were the line built by the Erie City Iron Works. We believe that no concern in the United States makes a line better suited to the general demand. For all kinds of work they are prepared to furnish a simple, strong, durable Engine, at a price that is not only reasonable, but low. Their great many years of business experience, combined with ability and energy, have built up for them a reputation for fair dealing and honesty of purpose, that is second to none; and the Engines built by the Erie City Iron Works possess more good features than any line of Engines built in the country, price, quality and efficiency considered.

As all know, the Engine of to-day is an altogether different production than the one in general use twenty, fifteen or even ten years ago. Fifteen years ago an Automatic Engine was not only a curiosity, but an experiment, but time and money have perfected the Automatic Engine, so that a large proportion of the Engines sold at the present time are of this type, some of the large concerns making nothing else.

This concern makes three distinct classes of Automatic Engines, as follows:

Fig. 1151 shows a Slide Valve, Center Crank, Medium Speed Engine, especially recommended where a good, strong, simple and reliable Engine is wanted, at a low price.

Fig. 1148 shows a Tangye Bed, Side Crank, Medium Speed, Automatic Engine

that is especially designed for power purposes, but its fine regulation and moderate price make it available for isolated electric light plants.

Electric light work, to get the very best results, ought to have an electric light engine; one made especially for this purpose, and Fig. 1150 shows the one designed by this concern for the work. Its extreme simplicity and close regulation place it in the front rank of engines of this kind. On all and each one of these, great care is taken to have every engine exactly right and sure to perform the work they are sold to do, every one being tested under full load before leaving the factory.

The other type of engine built by this concern is the Throttling Engine so commonly known. It is made with three styles of bed: Tangye, Box (made only to order now), and the Center Crank, or Self-Contained style. The same workmanship, material and care are used on these as on their Automatic Engines, and they will be found to possess the same advantages over other makes of Throttling Governor Engines that the Automatics do.

In brief, we consider this line of Engines to possess more good qualities than any other we know of. All Engines sold by us will be guaranteed to give perfect satisfaction; and any trouble that may be caused by improper construction, material, or workmanship, within a reasonable period, will be repaired without expense to the owner.

ENGINE CATALOGUE.

We will be pleased to send to any address, upon application, our twenty-four page catalogue, in which sizes and specifications are given of Engines, Boilers, Feed Water Heaters, Smoke Connections, Steam and Mud Drums, Boiler Fronts, etc.

OTHER ENGINES.

We have not deemed it expedient to go into any extended description of other well known types of Engines, such as the Corliss (made in endless variety), the 4-Valve type as made by Russell & Co., and the Buckeye Co., the Westinghouse, etc., etc., but will be pleased to furnish such information as lies in our power regarding these or any others.

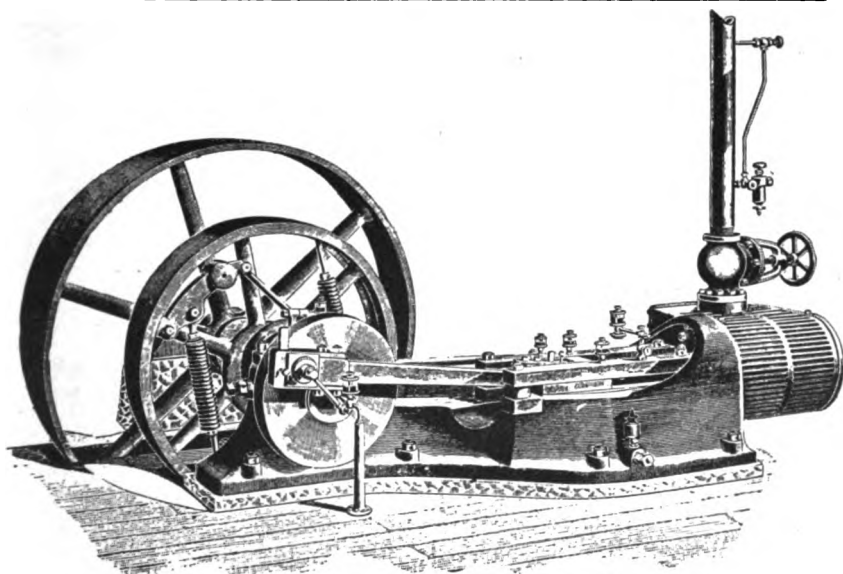


FIG. 1148. "TANGYE" BED AUTOMATIC CUT-OFF ENGINE.
Made in sizes from 45 H. P. upwards.

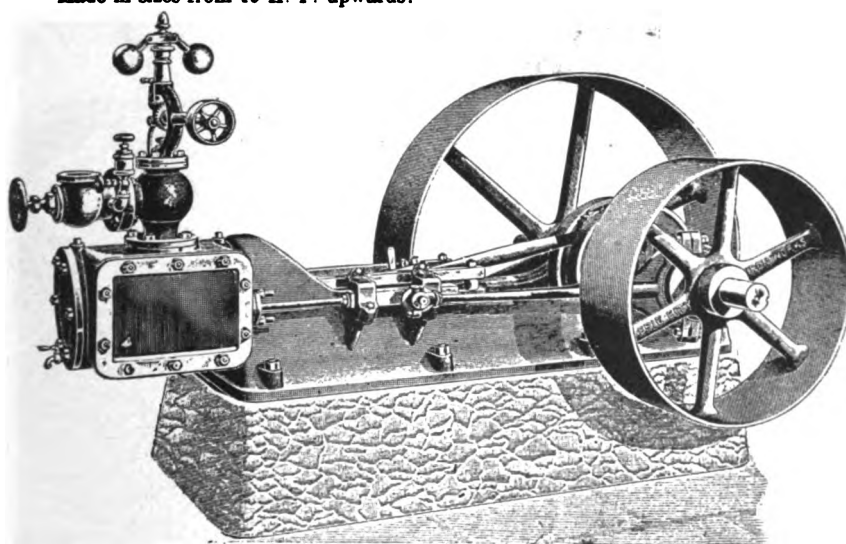


FIG. 1149. CENTER CRANK SELF-CONTAINED ENGINE.
Made in sizes from 8 H. P. upwards.

FIG. 1150. HIGH SPEED AUTOMATIC CUT-OFF ENGINE.
Made in sizes from 30 H. P. upwards.

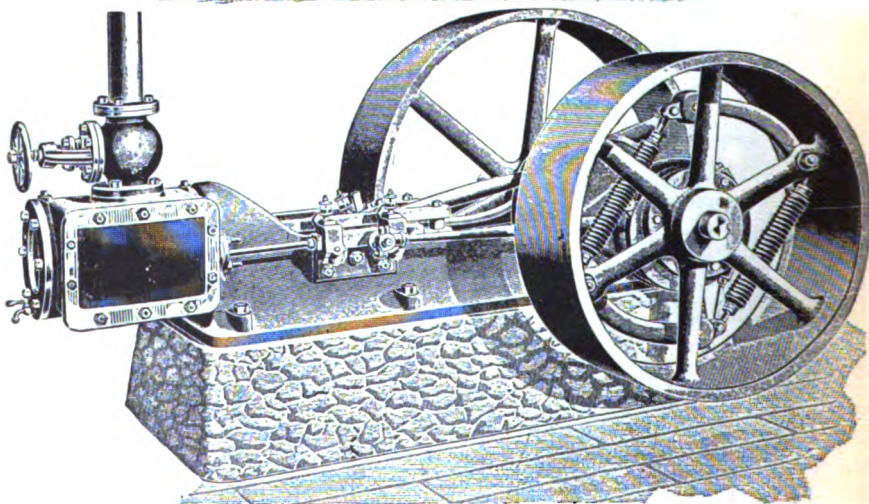
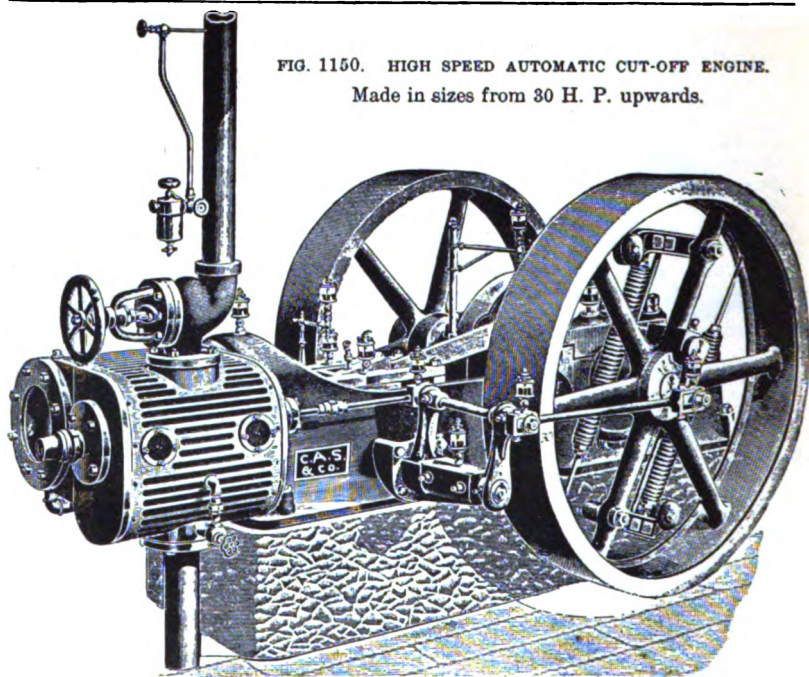


FIG. 1151. SLIDE VALVE CENTER-CRANK AUTOMATIC CUT-OFF ENGINE.
Made in sizes from 12 H. P. upwards.

Made in sizes from 35 H. P. upwards.

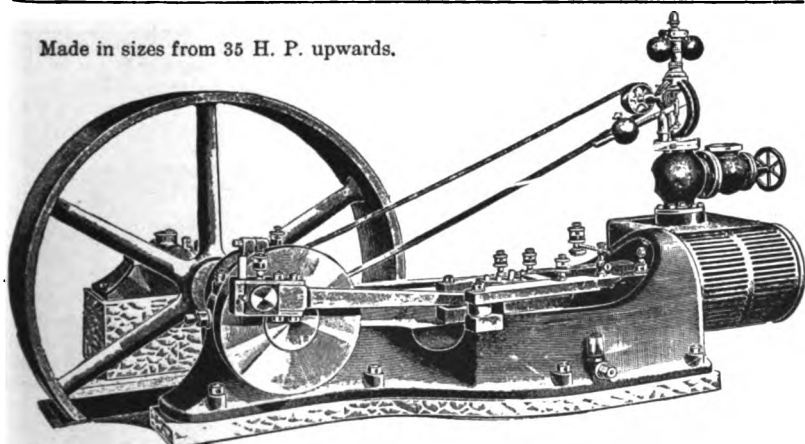


FIG. 1152 "TANGYE" BED STATIONARY ENGINES.

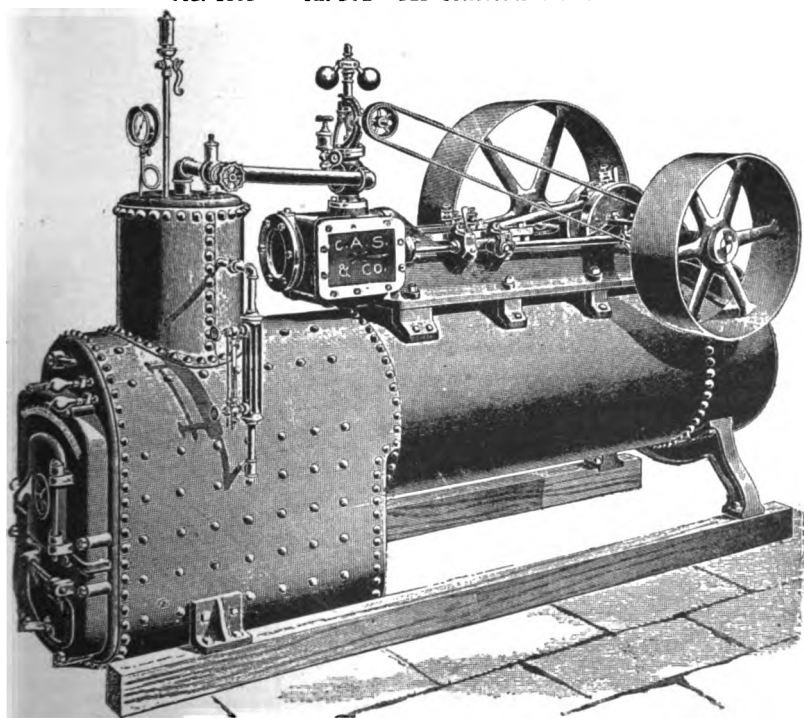


FIG. 1153. PORTABLE ENGINE AND BOILER.

Made in sizes from 8 H. P. upwards.

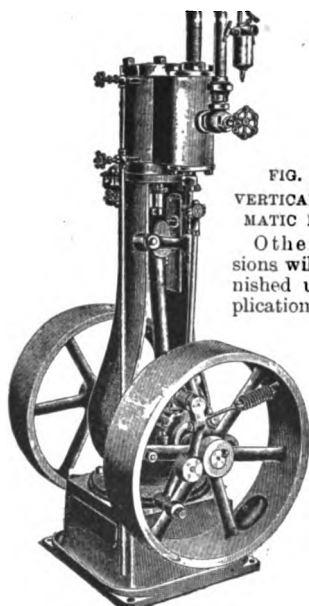


FIG. 1154.
VERTICAL AUTO-
MATIC ENGINE.

Other dimensions will be furnished upon application.

The Vertical Engine shown here is made from new patterns, combining many features that add to its simplicity, durability and economical performance. The Frame and Guides are cast in one piece; the Piston is deep in proportion to its diameter; the Valve is of the hollow piston type, and consequently perfectly balanced. These Engines have the Kimble Automatic Governor, which is very simple and effective.

H. P.	Price.	Rev.	Cylinder.	Pulley.
2	\$61.00	450	3 x 3½	16 or 20x4½
3	68.00	450	3½ x 3½	16 or 20x4½
4	80.75	375	4 x 4½	20 or 24x5½
5	89.25	375	4½ x 4½	20 or 24x5½
6	102.00	300	5 x 6	24 or 26x5½
7	114.75	300	5½ x 6	24 or 26x5½
8	136.00	275	5½ x 7	26 or 30x6½
10	160.00	275	6 x 7	26 or 30x6½
12	180.00	275	6 x 8	30 or 35x7½
16	216.00	275	7 x 8	30 or 35x7½

The Horse Power of above Engines is based on 80 lbs. initial steam pressure cutting off at one-fourth stroke.

All Engines are thoroughly tested before being shipped. These Engines may be run at speeds varying 20 per cent either way from above list, with good results;

but, unless otherwise specified, will be adjusted to run at listed speed, and the adjustment of governor should not be disturbed except by an experienced engineer.

With each Engine is furnished a full set of Oil Cups, Wrenches, Throttle Valves, and Lubricator.

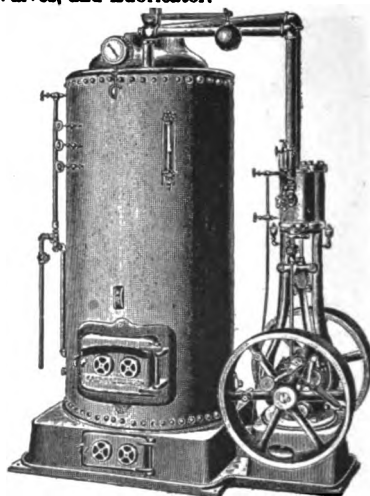


FIG. 1155. VERTICAL ENGINE AND BOILER.

The above cut shows the method of combining Engine and Boiler on the same base. We can furnish them on detached or separate bases at the same price, but recommend the Combined Base, as it furnishes a more stable foundation for Engines. The prices include Injectors and all necessary Fixtures, Fittings, etc., except Stack. Besides the combinations given in list below, we can furnish any other combination desired. For example, a 4 H. P. Engine can be furnished with an 8 or 10 H. P. Boiler. Prices named upon application.

Eng. H. P.	Boiler. H. P.	Price	Eng. H. P.	Boiler. H. P.	Price.
2	2	\$125.00	6	6	\$200.00
2	3	130.00	6	8	220.00
2	4	145.00	7	8	235.00
3	8	138.00	7	10	250.00
3	4	150.00	8	8	260.00
3	5	155.00	8	10	270.00
4	4	165.00	10	10	295.00
4	5	172.00	10	12	315.00
4	6	182.00	12	12	335.00
5	5	180.00	12	16	365.00
5	6	188.00			

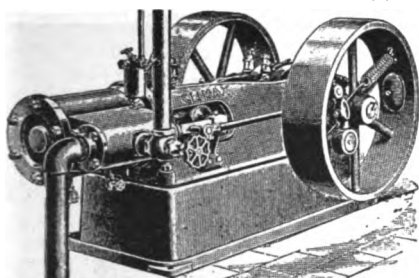


FIG. 1156. CLIMAX HORIZONTAL ENGINE.

The Climax Horizontal Engine is made from new patterns, combining many features that add to its simplicity, durability and economical performance. It has been the aim to construct an Engine as simple as possible, that will require very little attention, and lessen the liability of getting out of order.

It is a well known fact that "All strains go in straight lines." The design and construction of the Climax is in conformity with this fact, the strains being transformed directly from the cylinder to the shaft bearings. The Engine is center crank, and the construction and manner of machining frame, guides and cylinder has a tendency to keep the Engine always in alignment. An effort has been made to produce an Engine well constructed, simple, and with as few working parts as possible, thus reducing the power required to overcome friction, and the number of parts liable to get out of order. We claim for this Engine extreme simplicity, economy, durability, perfect regulation, and great strength. In the absence of instructions, Engines will always be sent with Sub-Base and smaller Automatic Pulley; and will also be adjusted to run at the lower listed speed.

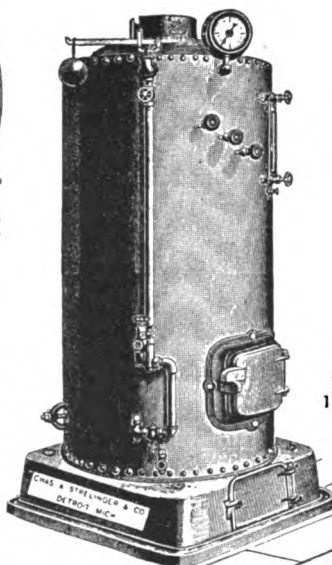


FIG. 1157.

The Fixtures for these Boilers include Base, Grates, Doors and Hood. The Fittings include Glass Water Gauge, Gauge Cocks, Steam Gauge Safety Valve, and Blow-off Cock.

For prices of Injectors, see page 318.

Horse Pow	Price.	Diam. inch's	Hgt. inch's	No of Tub's	Diam Tub's	Lgth. Tub's	Wgt. lbs.
2	\$60	20	43	19	2	25	475
3	65	20	49	19	2	31	550
4	80	24	50	31	2	39	1000
5	87	24	60	31	2	40	1200
6	96	26	60	37	2	38	1350
8	115	30	60	43	2	36	1630
10	120	30	72	43	2	48	1850
12	150	36	72	55	2	48	2600
16	180	36	96	55	2	64	2950

PRICES AND DIMENSIONS OF CLIMAX HORIZONTAL ENGINES.

No.	Without Sub-Base.	With Sub-Base.	Horse Power.	Revol. at	Automatic Pulley.	Belt Pulley.	Floor Space.	Wgt.	
1	\$130.00	\$138.00	5½x7	8	275	26 or 30x6½	12x8	20x46	1050
1	130.00	138.00	5½x7	10	330	26 or 30x6½	12x8	20x46	1050
2	160.00	168.00	6 x7	10	275	26 or 30x6½	12x8	20x46	1100
2	160.00	168.00	6 x7	12	330	26 or 30x6½	12x8	20x46	1100
3	183.00	195.00	6 x8	12	275	30 or 35x7½	16x8	23x53	1350
3	183.00	195.00	6 x8	14	330	30 or 35x7½	16x8	23x53	1350
4	220.00	232.00	7 x8	16	275	30 or 35x7½	16x8	23x53	1400
4	220.00	232.00	7 x8	19	330	30 or 35x7½	16x8	23x53	1400

The above power is based upon 80 lbs. initial steam pressure, cutting off at one-fourth stroke. The prices include a full set of Oil Cups, Lubricator, Wrenches, and Throttle Valve.

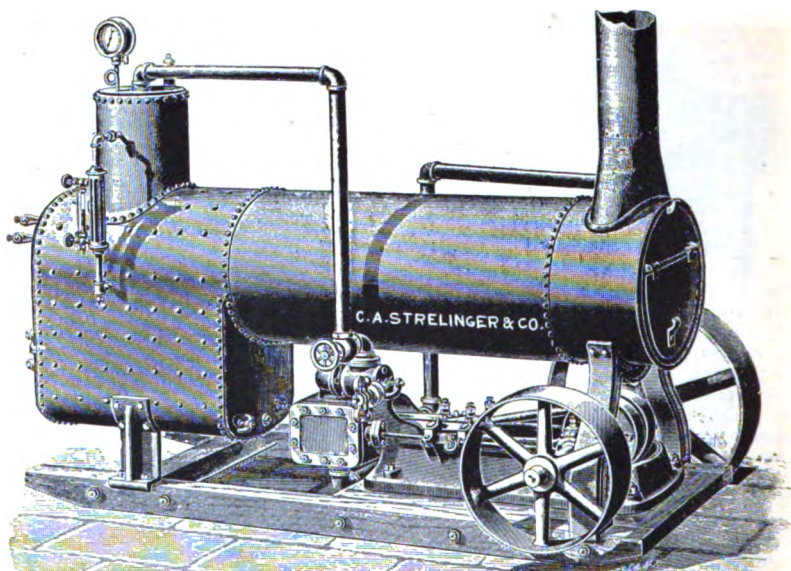


FIG. 1158a. UNDERMOUNTED PORTABLE ENGINE AND BOILER.

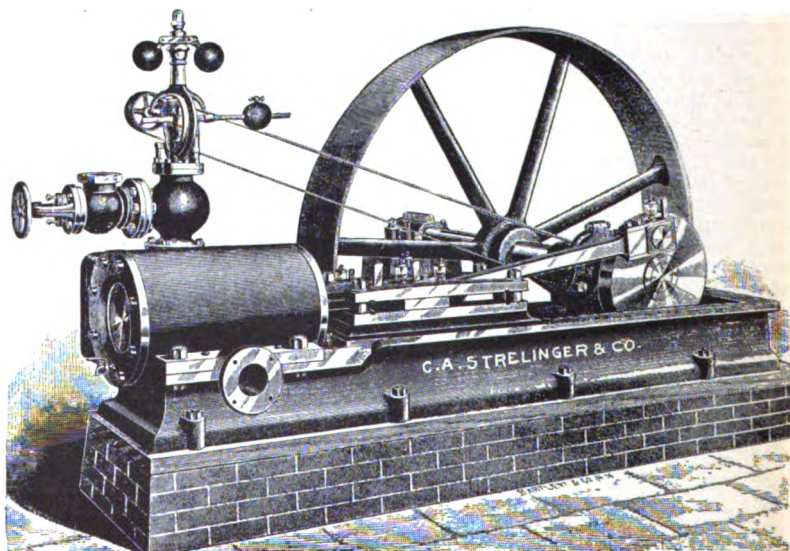


FIG. 1159a. BOX BED STATIONARY ENGINE.

ENGINE GOVERNORS.

The four best known Engine Governors in the market are the Gardner, Pickering, Judson and Waters. They are all made in the same sizes, and are alike in price. We carry in stock, and illustrate here, the Gardner, but can furnish any of the other makes at prices as given in table below, and will send full descriptive circulars upon application.

Two styles of Governors are made; the Standard Medium Speed and the Spring High Speed—the letters A and B denoting with or without Automatic Stop in either style.

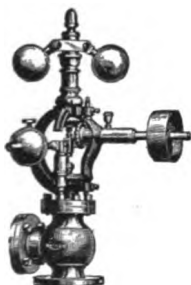


FIG. 1160.

CLASS A, STANDARD.



FIG. 1161.

CLASS B, STANDARD.

Fig. 1160 represents a Gardner Standard Governor, class "A"; this is a gravity governor, having an Automatic Safety Stop and Speeder. This governor is especially adapted to the larger type of Stationary Engine.

Fig. 1161 represents a Gardner Standard Governor, class "B"; a combination of the gravity and spring actions, and is adapted to all styles of engines. They are provided with Speeder and Sawyer's Lever, but are not Automatic.

Figs. 1162 and 1163 represent the Gardner Spring Governor. These are designed especially for high-speed stationary and portable engines. They are very quick and sensitive in action.

Class "B," Fig. 1162, represents the Spring Governor without Automatic Stop, but furnished with Speeder and Hand Lever.

Class "A," Fig. 1163, represents the Spring Governor with Automatic Stop. This Also has Speeder and Hand Lever.

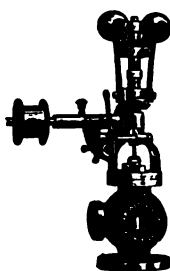


FIG. 1162.

CLASS B, SPRING.
WITH SPEEDER AND HAND
LEVER.

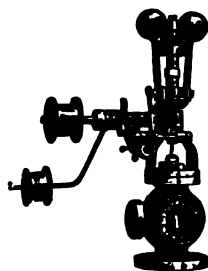


FIG. 1163.

CLASS A, SPRING.
WITH SPEEDER, HAND
LEVER AND
AUTOMATIC STOP.

PRICE LIST
STANDARD AND SPRING GOVERNORS.

Size.	Class A, Plain.	Class A, Finished.	Class B, Plain.	Class B, Finished.
$\frac{1}{4}$ in.			\$14.40	\$16.00
1 "			16.00	17.60
$1\frac{1}{2}$ "			17.60	20.00
$1\frac{3}{4}$ "	\$23.60	\$26.80	20.00	23.20
2 "	28.80	32.00	24.00	27.20
$2\frac{1}{2}$ "	38.40	42.40	32.00	36.00
3 "	47.20	53.60	40.00	46.40
$3\frac{1}{2}$ "	56.80	64.00	48.00	55.20
4 "	66.40	74.40	56.80	64.80
$4\frac{1}{2}$ "	76.80	85.60	66.40	75.20
5 "	87.20	96.80	75.20	84.80
6 "	112.00	123.20	97.60	108.80

Prices of larger sizes upon application.

The $\frac{1}{4}$ inch size Governor is furnished in but one style, as in Fig. 1162. Price, plain, \$12.50; finished, \$14.40.

BRISTOL'S RECORDING PRESSURE GAUGE.

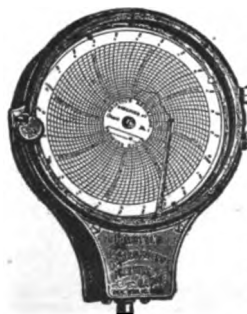


FIG. 1164.

great value. We will send descriptive circular, with prices, upon application.

Makes a continuous record day and night, of Steam, Gas, Water or Air Pressure; is adapted to all ranges of pressure. Users of steam in Factories, Mills, Water and Gas Works, Public Buildings, etc. will find this Instrument of

ENGINE CASTINGS

We show here a line of Castings for Engines and Dynamos which are designed to meet the wants of a large class of Amateurs, who wish Machinery, the parts of which are small enough for them to make with limited tools, and which will have sufficient power for their needs.

It must be understood that the Engine and Dynamo Castings described here are Castings only, and not finished Engines. In a number of cases we have given the cost of these castings with certain parts finished, and have tried to make ourselves plainly understood

fitted; Connecting-rod and Eccentric strap joints are planed and fitted.

Set "C" includes set "B" with the addition of Cylinder bored and faced; Steam Chest and Guide bored; Crank-pin, Crank Discs and Shaft finished and put together.

Set "D." In addition to the work done in the other sets, the Pillow-blocks and Eccentric-straps are bored; Eccentric turned; Piston, Cross-head, Slide-valve, and Fly-wheel turned and fitted.

Fig 1165 shows the appearance of Up-right Engines, which are solid and well made. With exception of Guide, Frame

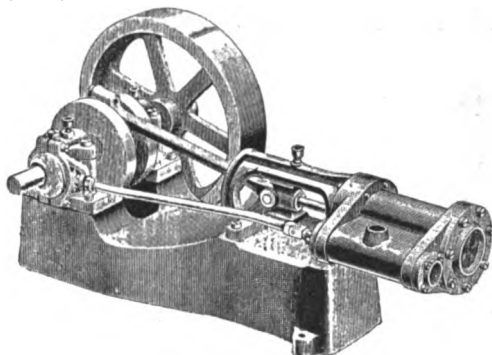


FIG. 1164.

HORIZONTAL HIGH PRESSURE STYLE.

We furnish Castings for the above either rough or partially finished. The dimensions are as follows:

	$\frac{1}{2}$	$\frac{3}{4}$	1	2	
	H. P.	H. P.	H. P.	H. P.	
Bore Cylinder,	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{2}$	3	in.
Stroke,	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	"
Diam. Fly-wheel,	6	7	9	11	14
Face " "	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	"
Steam Pipe,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	"
Exhaust Pipe,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	"
Bore Valve Chest,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{2}$	"
Travel of Valve,	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	"
Crank Shaft,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{2}$	"
Crank Pin,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{2}$	"
Piston Rod,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	"
Valve Rod,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	"
Diam. Eccentric,	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	"

Set "A" is a complete set of Castings, material and screws for putting together.

Set "B," same as set "A," excepting that the Bed Plate and Guide Feet are planed; Pillow Blocks are planed and caps

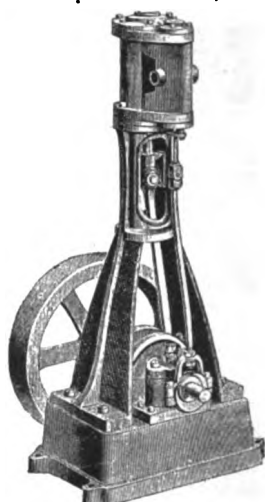
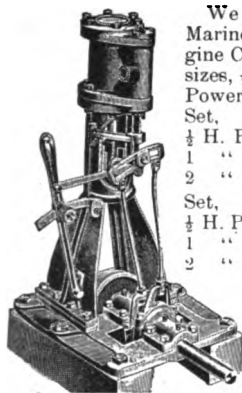


FIG. 1165. VERTICAL HIGH PRESSURE STYLE and Bed-plate, the parts are the same as in the Horizontal Engines, and are furnished in the same sizes. The castings, sets and prices are the same as for corresponding sizes of Horizontal Engine.

	Set "A"	"B"	"C"	"D"
$\frac{1}{2}$ H. P.	\$3.75	\$4.50	\$5.50	\$7.50
$\frac{3}{4}$ "	5.00	6.50	8.00	12.00
1 "	8.00	10.00	12.00	16.00
2 "	15.00	18.00	22.00	30.00
3 "	20.00	25.00	33.00	45.00

The above prices are not on completed Engines, but only on a full complement of parts in various stages of completion, as per the foregoing description.

We can furnish finished Engines on special order.

FIG. 1166.
MARINE STYLE.

We can furnish a line of Castings for Center Crank Vertical Engines from 1 to 6 Horse Power.

These Castings include Cylinder, Main Frame, Base, Fly-Wheel Pulley, Steam Chest and Lid, Cylinder Head, Piston Head, Eccentric and Straps, Cross-Head, Journal Boxes, Valve, Guides, etc. In fact all castings necessary with exception of a Governor.

The prices given here are for castings only, not finished in any way.

FIG. 1167. CENTER CRANK VERTICAL STYLE.

The Cylinder, Main Frame and Base are cast in separate pieces, making it possible to build them on quite small lathes.

Horse Power.	Price of Castings.	Size of Cylinder.	Diam. of Fly-Wheel.	Floor Space.
1	\$9.00	2½x3	11	7x12
2	12.00	3x4	14	8x14
3	16.00	3½x5	16	12x18
4	24.00	4x6	21	18x27
6	34.00	5x6½	21	18x27

With Reversible Link motion for boat use, add \$1.25, \$1.50, \$2.50 and \$3.00 to the respective sizes; and with Steel Crank Shaft add \$2.00, \$3.00, \$4.00 and \$5.00

We can furnish the Marine style of Engine Castings in three sizes, ½, 1 and 2 Horse Power, as follows:

Set,	"A"	"B"
½ H. P.,	\$9.00	\$11.00
1 "	16.50	20.50
2 "	22.50	30.00
Set,	"C"	"D"
½ H. P.,	\$13.00	\$19.00
1 "	23.50	34.50
2 "	38.00	50.00

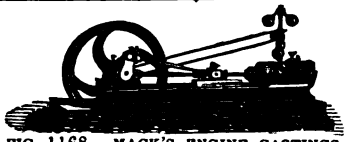


FIG. 1168. MACK'S ENGINE CASTINGS.

These Castings are well proportioned, and make a neat and strong engine when done. Every Casting is furnished, also a Malleable Iron Connecting Rod, Steel Piston Rod and Valve Rod, both of which are smooth and true, ready to be fitted to the piston. A Steel Crank Shaft of suitable size is also furnished.

No. 0, Cylinder has 2 in. stroke, 1 in. bore. Complete set of Castings, \$2.50.

No. 1, Cylinder has 3 in. stroke, 1½ in. bore. Complete set of Castings, \$4.00.

No. 2, Cylinder has 4 in. stroke, 2½ in. bore. Complete set of Castings, \$10.00.

We charge extra for boring Cylinder and facing off both ends as follows: No. 0, \$1.00; No. 1, \$1.50; No. 2, \$2.50.

All machine screws to put engine together are furnished at following prices: No. 0, \$0.30; No. 1, \$0.40; No. 2, \$1.00.

The No. 1 Engine will develop about ½ horse power; the No. 2, 1 horse power.

We can furnish complete sets of Governor Castings to those who desire to make their own Governors, at the following prices:

Size.	Iron.	Brass.
½	\$1.00	\$2.00
¾	2.00	4.00
1	2.00	4.00



FIG. 1169.

THE STEAM ENGINE INDICATOR.

The Steam Engine Indicator is an instrument for drawing a diagram on paper which shall accurately represent the various changes of pressure on the piston of steam engine during both the forward and return stroke. The Indicator was invented by James Watt, and extensively used by him in perfecting his engines.

BRIEFLY.—The Indicator tells how much horse power is being produced, and how much steam it takes to produce it. Also whether the engine is in proper condition to produce the greatest amount of power with the least amount of fuel.

The only proper means to adjust the valves of an engine is by the use of an Indicator. The amount of power re-

Look over figures 1 to 14.

quired to run any machine can be easily ascertained by its use.

ECONOMY.—The use of the Indicator is the best way of attaining economy in the use of steam, and in numberless cases has been the means of saving its cost in the economy of fuel, in an incredibly short time.

Up to within the past few years the prevalent idea was that the Engine Indicator was an instrument to be used only in large plants, and by experts. But it is easily demonstrated that its use is—relatively—as essential and advantageous for a 10 H. P. as for a 200 H. P. plant.

In past years the most commonly used Indicators, were the Thompson, the Tabor, and the Crosby, and although there are large numbers of these in use, the high prices asked for them have been a great hindrance to their more common use.

The prices of the above named instruments, range from \$75.00 upwards. During the past few years, there have been brought out a number of Indicators to meet the demand for an instrument, that would be reliable and serviceable, and at prices within the reach of ordinary purses. We show here two styles which have been on the market for some time; large numbers of them have been sold. We have had customers use them in connection and comparison with, all of the best known high grade Indicators, and in no case have they failed to give satisfaction. In fact we guarantee every Indicator sent out, to give satisfaction in all respects.

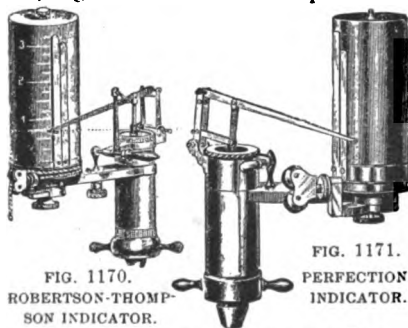


FIG. 1170.
ROBERTSON-THOMP-
SON INDICATOR.

FIG. 1171.
PERFECTION
INDICATOR.

Both the Robertson-Thompson and Perfection Indicators, are standard size instruments with piston one-half inch area. Materials and workmanship are first-class.

ROBERTSON-THOMPSON INDICATOR.

Packed in handsome polished case, with two Straight Cocks, or one 3 Way, two Springs, Scales, Cord, Cards, Pencils, Oil, Wrench, Screw Driver, and Instruction Book. Price, complete, \$40.00. Extra Springs, \$2.50 each.

PERFECTION INDICATOR.

Packed in substantial case, one Straight Cock, 2 Springs, Scales, Cord, Cards, Pencils, Oil, Screw Driver, and Instructions. Price, complete, \$30.00. Extras: Springs, \$2.50 each; Straight Cock, \$3.00; 3 Way Cock, \$6.00. Ammonia Indicator, \$40.00. Aluminum Indicator, \$40.00. This is the same as the Perfection, but has aluminum reciprocating parts, instead of steel.

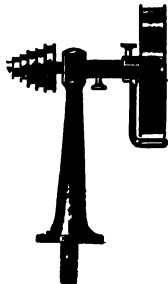


FIG. 1172.
ALUMINUM REDUCING
WHEEL, \$10.00.

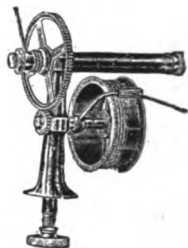


FIG. 1173.
DANDY REDUCING
WHEEL, \$11.00.

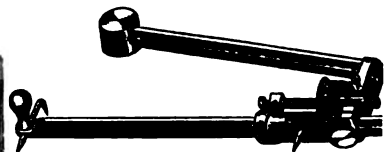


FIG. 1174.
AVERAGING PLANIMETER.
Price, \$10.00.

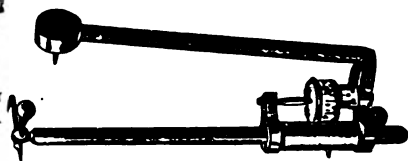


FIG. 1175.
"STANDARD" AVERAGING PLANIMETER.
In Velvet Lined, Leather Case, \$15.00.

GAS AND GASOLINE ENGINES.

These are, to many persons, an entire novelty. Many conceive them to be simply a Steam Engine in which the steam is generated by the use of gas as fuel; this is a mistake. In the Gas Engine, a definitely proportioned mixture of gas and air is drawn into the cylinder, and at the proper moment ignited. The consequent expansion of gas is used in driving the piston.

There has always been a general demand for a simple Motor of some description, that would be economical, safe, clean, occupy small floor space, require but little attention when running, would not require an experienced engineer to run it, and, while it might be run twelve hours a day constantly, could also be used to especial advantage where occasional, or intermittent power was required.

The Gas or Gasoline Engines fulfil all these requirements. They can be used with ordinary illuminating gas, natural gas, gas manufactured from gasoline, or gasoline direct from a tank, and give equally satisfactory results.

ECONOMY—The *maximum* consumption of fuel for ten hours' run is 135 ft. of natural gas, or 180 ft. of illuminating gas, or one gallon of 74 test gasoline, for each horse power developed. Thus, a 4 H. P. Engine running ten hours would use 4 gallons of gasoline. The amount of gasoline used, however, is in proportion to the power required. The consumption of gas or gasoline is automatically governed, and in many cases we find that the actual amount of gas or gasoline used, is not more than half of the maximum figures stated above.

SAFETY—It is practically an impossibility to explode these Engines.

ATTENTION.—These Engines require no engineer, fireman, or other attendants. From five to ten minutes per day is all the attention required; this time is consumed in cleaning Engine and filling the oil cup. After being started, the Engine may be left with perfect safety for ten hours.

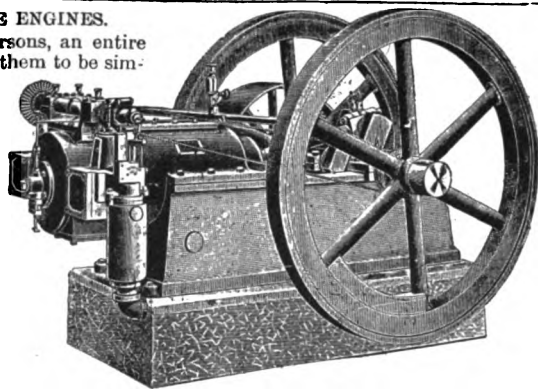


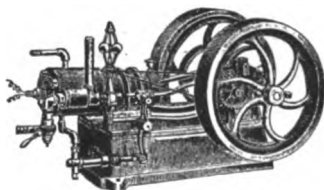
FIG. 1176. SPRINGFIELD GAS ENGINE.

THE ENGINE WE SELL is made by the Springfield Gas Engine Co. There are over sixty different manufacturers, but, in our judgment, there are not more than four or five who make strictly first-class high grade Engines, and the Springfield Co. is one of these. The other three or four we are not saying anything about, for obvious reasons.

We have sold large numbers of these Engines, from 1 to 25 horse power—have two of them in constant use, and believe they are at least equal to—if not better than—any other Engine in the market.

We will be pleased to send fully descriptive catalogue of Gas and Gasoline Engines to any one desiring it. This catalogue treats of the subject at considerable length, and furnishes very complete information.

GAS ENGINE CASTINGS.



Copyright 1894. All rights reserved.

FIG. 1177.

The above cut shows the Weed Gas Engine. This is a small Engine of about $\frac{1}{2}$ H. P. We can furnish a complete set of

Castings in the rough, all parts, screws, etc., with full instructions and blue print working drawings. Price, \$15.00.



FIG. 1178. GASOLINE STEAM ENGINE.

The cut shows the Old's Gasoline Engine. These Engines have been on the market for nearly ten years; there are hundreds of them in use giving satisfactory results. Are made in sizes as given in following table:

H. P.	Price.	Floor Space.	Weight.
1	\$130.00	22x36	500 lbs.
2	180.00	24x44	700 "
3	225.00	26x50	800 "

THE SHIPMAN ENGINE.

This is an Automatic Kerosene-Burning Steam Engine. There are at the present time, upwards of forty-five hundred of these in use, giving the best of satisfaction. The illustrations here show what is known as the "Boston Model," in both the Stationary and Marine types.

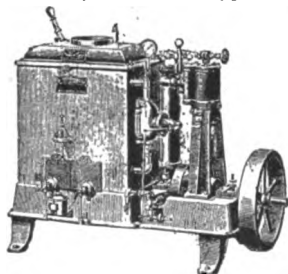


FIG. 1179.

SHIPMAN ENGINE, BOSTON MODEL, STATIONARY.

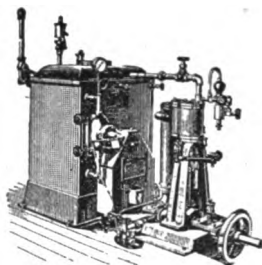


FIG. 1180.

SHIPMAN ENGINE, BOSTON MODEL, MARINE.

The Shipman Engine Co. also make what is known as the "Rochester Model," which sells at slightly lower prices, and are made in sizes from 1 to 22 H. P.

Complete catalogue of Shipman Engines, etc., sent to any address for 2-cent stamp.

ELECTRIC DYNAMOS AND MOTORS.

We have, from time to time, done more or less business in the way of furnishing our customers with Electrical Dynamos and Motors. We have in use three Motors and four Dynamos; some, five or six years old, others just put in.

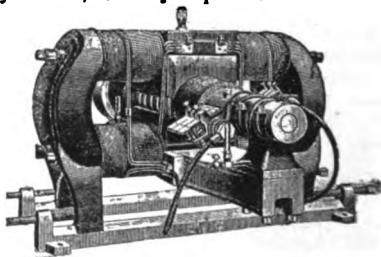


FIG. 1181.

The Dynamos and Motors we use and sell are of different types. We are not confined to any particular make or style and are therefore free to select for our customers such machines as are best adapted to their needs.

Taken as a whole, the Electrical business is a very complex one. We don't know very much about it, but we do know just enough to furnish machinery, that is first-class in all particulars, and will guarantee that any machines we furnish will perform satisfactorily all that we claim for them.



TOKIO

LACQUERS.

These are intended for use on metallic surfaces, and serve the double purpose of making a durable, though invisible, protective coating, and of imparting color when desired. They are made in Transparent, Gold, Dull Black, or any color. The Gold is very deep in tone, and can be mixed with the Transparent to produce any shade of gold desired. Our sales consist almost entirely of the Transparent, and this is the only kind we carry in stock. The other colors we furnish to order only, and cannot supply in less quantities than a gallon.

Tokio Lacquers are easily applied, and possess extreme durability; they are sent out, of brushing consistency, but by means of the Reducing Liquid any desired body can be obtained.

For dipping bulk work, these Lacquers may be reduced, by adding as much as three parts of Reducing Liquid, to one part of Lacquer, and articles so lacquered will not adhere or stick together; the lacquer drips off perfectly, leaving an even and durable finish.

When the articles to be lacquered are large enough to hang up to dry separately, the lacquers can be used for dipping of the consistency sent out. Bronze statuary and the larger ornaments of stoves, etc., can be lacquered in this manner very satisfactorily, as the lacquers flow out perfectly, and there is nothing made that will give a more durable protective coating.

A valuable feature of Tokio Lacquers is, they contain no gun-cotton or other explosive, and are consequently safer to use, than many other lacquers. Also the flash

point is much higher than many lacquers now in use, which gives an additional element of safety.

We furnish these in three grades or qualities, which we call "A," "B" and "C." "A" grade is used only for the finest work, such as silverware, etc.; "B" grade is used for fine work and general purposes, and is really as fine in quality as most Lacquers, sold at a much higher price. For many purposes the "C" grade will be found to answer admirably.

PRICE LIST TOKIO LACQUERS.

	Gallon.	Quart.	Pint.	$\frac{1}{2}$ Pint.
"A"	\$4.00	\$1.25	\$0.75	\$0.45
"B"	2.75	.95	.60	.35
"C"	1.75	.60	.40	.25

REDUCING FLUID OR "THINNER."

	Gallon.	Quart.	Pint.	$\frac{1}{2}$ Pint.
"A"	\$2.75	\$0.95	\$0.60	\$0.35
"B"	2.25	.80	.50	.30
"C"	1.50	.55	.35	.25

Special prices on quantities.

EMERGENCY REMEDIES.

Just before going to press—as the newspapers say—our attention was called to a line of Medicine Chests for shop and family use. These Chests or cases contain a most excellent selection of remedies, to be used in case of sickness and accident. "Accidents will happen," and it is well to be prepared for them. We will be able soon to furnish descriptive circulars of these Cases.

The No. 3 "Factory" Case, price \$10.00, is about 12 inches square, with sliding trays, and contains the following: One Book "Red Cross Society," Shears, Forceps, Splints, Rubber Finger Cots, Surgeons' Needles, Silk and Catgut, Graduated Medicine Glass, Glass Syringe, Tourniquet for hemorrhage, Tray, Towel, Plain and Safety Pins, Four Surgeons' Sponges, 20 Bandages, Absorbent Cotton, Absorbent Lint, Antiseptic Jute, Antiseptic Oakum, Styptic Cotton, Carbolyzed Gauze, Selected Cotton Batting, Stearate Zinc and Iodoform, Powder to stop bleeding, Powder to relieve burns, Carron Oil for burns, Carbolyzed Oil; Petrolatum, plain and carbolyzed; Carbolic Acid, Spirits of Ammonia, Stimulant, Sun Cholera Cure, Antiseptic, Emetic, Toothache Cure, Earache Cure, Eye Stones, Surgeons' and Court Plasters, on spools and in sheets; Mustard Plaster.

GEAR TEETH.

The cuts on this and following page represent actual size of Gear Teeth, from 2 to 48 Pitch.

For complete line of Gearing see pages 369 to 379 inclusive.



8 P



7 P



6 P



5 P



4 P



32



32



24



28



20 P



22



18 P



16 P



14 P



12 P



10 P



9 P



WATER MOTORS.

It is conceded that nothing is so convenient, and under all ordinary circumstances, nothing should furnish power as cheaply as a Water Motor. Although such motors offer many advantages, comparatively few are used, and this can only be accounted for by the high cost of power so obtained, because the machines of this class generally in use are very inefficient and unserviceable.

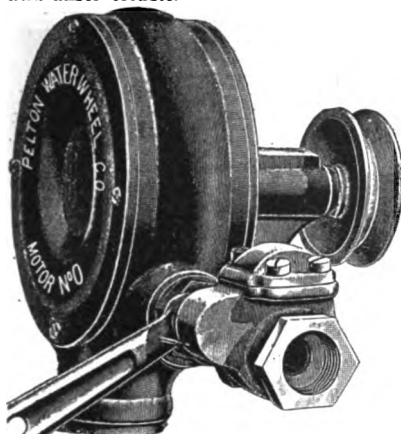


FIG. 1215. NO. 0 PELTON WATER MOTOR.

We believe that the Pelton Motor will be found superior to all others, as regards strength, durability, economy of water, and, in fact, all points that constitute a high-grade Water Motor.

It is needless to specify the great variety of uses to which these Motors are adapted. The following list embraces some of the machinery to which they are applicable as power: Dynamos for Electric Lights, Passenger and Freight Elevators, Machine Tools, Printing Presses, Wood Working Machinery, Exhaust Fans and Blowers, Power Pumps, etc.

The smaller Motors are for Churns and various Dairy machines, Coffee Roasters, Organs, Sewing Machines, etc.

Having reference to capacity and efficiency, the prices on these Motors are much lower than those of any other make.

Attention is called to the fact, that parties using Water Motors are often misled as to the claims made for efficiency, which, in the majority of cases, are

greatly in excess of anything ever realized in practice, but which, without any means of disproving them, or opportunity for comparison, go unchallenged.

The Pelton Motor is guaranteed, with a proper setting, to fully realize in practical working all claims made, or purchase price will be refunded.

No.	Price.	Weight.	Size Wheel.	Diam. Pulley.	Face Pulley.
0	\$20.00	20 lbs.	4 in.	2 in.	
1	30.00	30 "	6 "	3 "	
2	60.00	110 "	12 "	4 "	4 in.
3	125.00	320 "	18 "	5 "	4½ "
4	175.00	370 "	18 "	6 "	5 "
5	275.00	650 "	24 "	8 "	8½ "

The Pulley on No. 0 Motor has a ¼ inch V groove, and on No. 1, ½ inch V groove.

Full descriptive circulars will be sent upon application.

WATER WHEELS.

In connection with Water Motors we will be pleased to furnish such information as lies in our power regarding Water Wheels for all purposes.

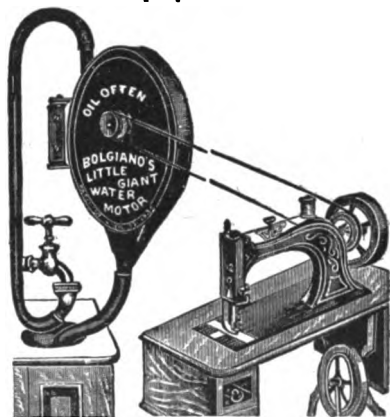


FIG. 1216. LITTLE GIANT WATER MOTOR.

No. 1 Motor, price \$5.00 complete, has 5½ inch wheel, and is used for Sewing Machines, Fans, Scroll Saws, Dental Engines, Music Boxes, etc., etc.

No. 2 Motor, \$10.00 complete, used for Coffee Mills, Pea-Nut Roasters, Small Printing Presses, Ice Cream Freezers, etc.

The Water Motor shown above can be used to good advantage for light work; it is low in price, and is sold and used quite extensively.

BOILERS.

Our "Standard" Boilers are made throughout of Open-Hearth Homogeneous Flange Steel plate, of 80,000 lbs. tensile strength, with an elastic limit of over 30,000 lbs.; elongation of over 20 per cent, and reduction of area of 45 to 50 per cent. This steel will turn over and close down solid without fracture, when cold, or after heating and cooling in water, and will not blister.

The shells of Nos. 1, 2, 3 and 4 are formed of a single plate; Nos. 3½, 5 and larger sizes, up to and including No. 13, have one plate in the bottom and one in the top; Nos. 14, 15, 16 and 17 have bottom of one plate about 9 ft. wide, and one or more plates in the upper section. In all sizes up to and including No. 17, the bottom of boiler will be without seams, except around the heads. The great advantages of a boiler made in this way are apparent; there are no seams over the fire, and the bottom presents a smooth, even surface, which greatly facilitates cleaning, prevents sediment, and consequent burning of plates.

The longitudinal seams of the shell are double-riveted, and the dome flanges of No. 4 and larger sizes are double riveted to the boiler.

The rivets are spaced in accordance with the most approved rules, and the greatest possible strength secured at the seams.

The edges of the plates are planed, and the caulking is done by Connery's patent concave system.

Special attention is given to the bracing, which is a most important item in boiler construction. All "Standard" boilers up to and including No. 3½, are braced with solid stay rods, running from head to head, screwed in place and riveted over and outside of head. All large boilers are braced throughout with solid crow-foot braces. The dome heads are thoroughly braced, the braces running from head to shell of dome. All stay-rods and braces are made of a special refined iron of 50,000 lbs. tensile strength, and enough braces are used to insure a large factor of safety.

The "Economic," Fig. 1222, is the best Portable Boiler in the market, and the engravings illustrate the latest improve-

ments in the boiler, consisting chiefly in the new form of Combustion Chamber at the rear end, connecting the upper and lower series of tubes. This combustion chamber is lined with fire brick in the same manner as the furnace, and soon attains a very high temperature, greatly increasing the efficiency of the boiler by insuring complete combustion of the gases passing through the lower series of tubes and coming in contact with this fire-brick lining.

It occupies but little space, is a rapid steamer, and combines with the safety of the Stationary Return Tubular Boiler, the convenience and portability of a Portable.

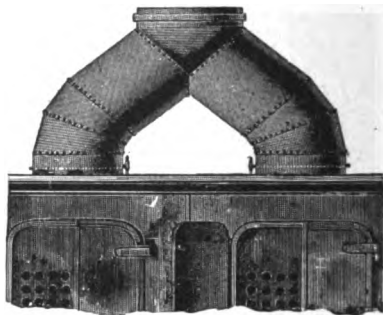


FIG. 1217.

SMOKE CONNECTION FOR TWO BOILERS.



FIG. 1218.

STEAM DRUM FOR TWO BOILERS.



FIG. 1219.

MUD DRUM FOR TWO BOILERS.

In connection with the line of Boilers shown here, we would be pleased to figure on Smoke Connections, Smoke Stacks, Steam and Mud Drums, etc., etc.

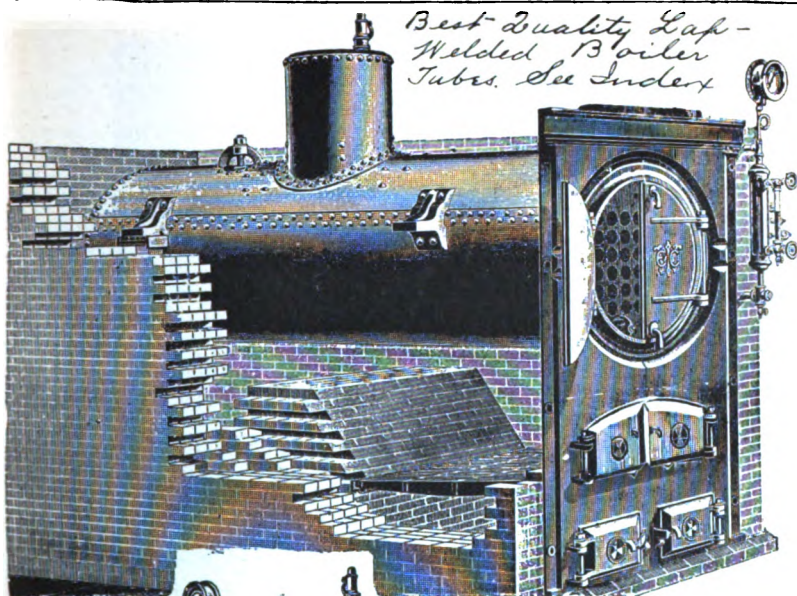


FIG. 1220.

"STANDARD" BOILER
WITH FULL ARCH FRONT.

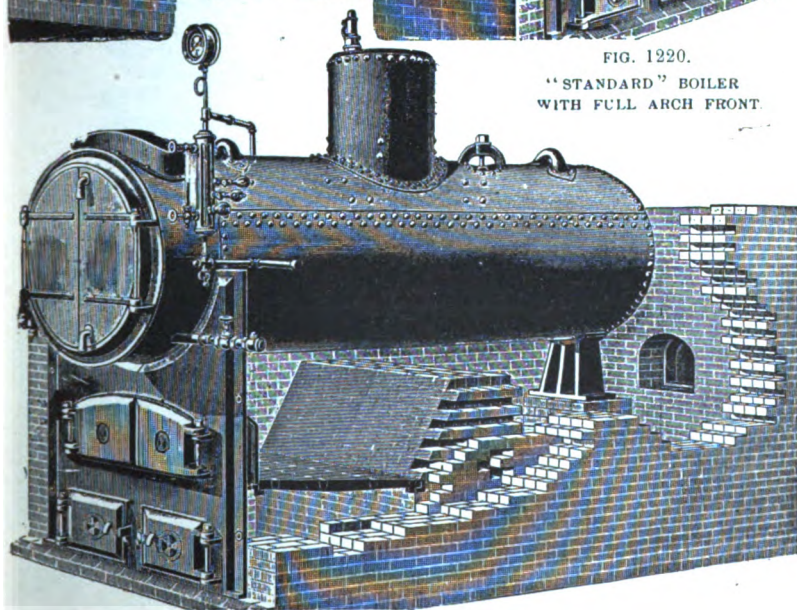


FIG. 1221. "STANDARD" BOILER WITH HALF ARCH FRONT.

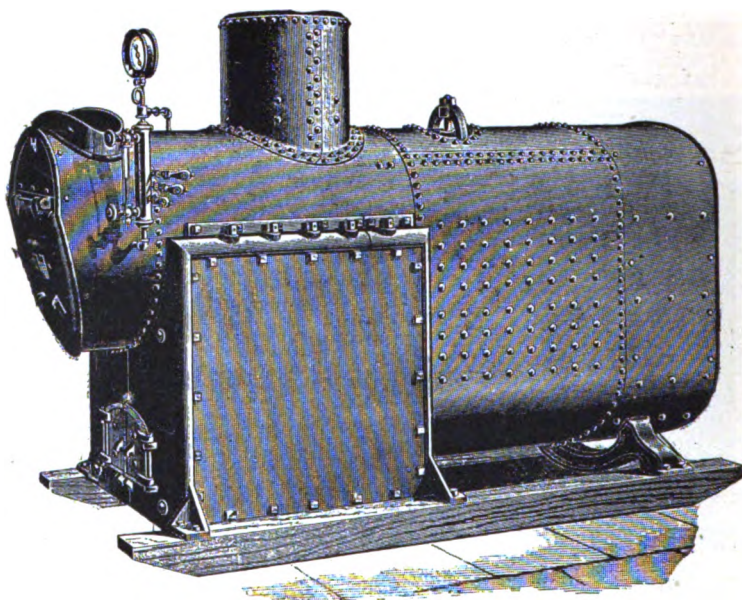


FIG. 1222. THE "ECONOMIC" RETURN TUBULAR PORTABLE BOILER.

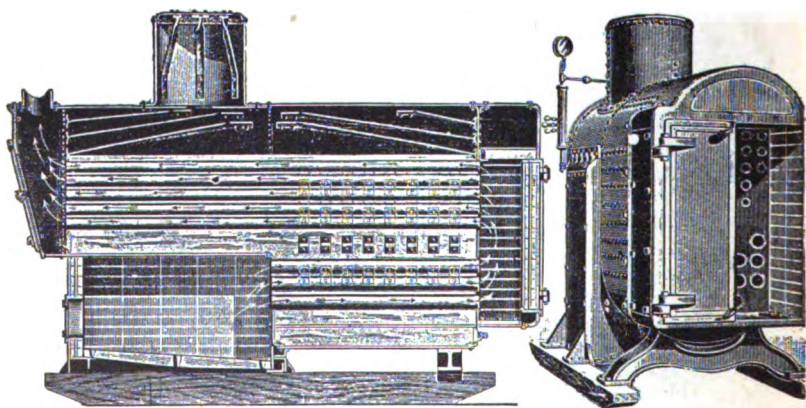


FIG. 1223. THE "ECONOMIC" BOILER.—SECTIONAL VIEW.

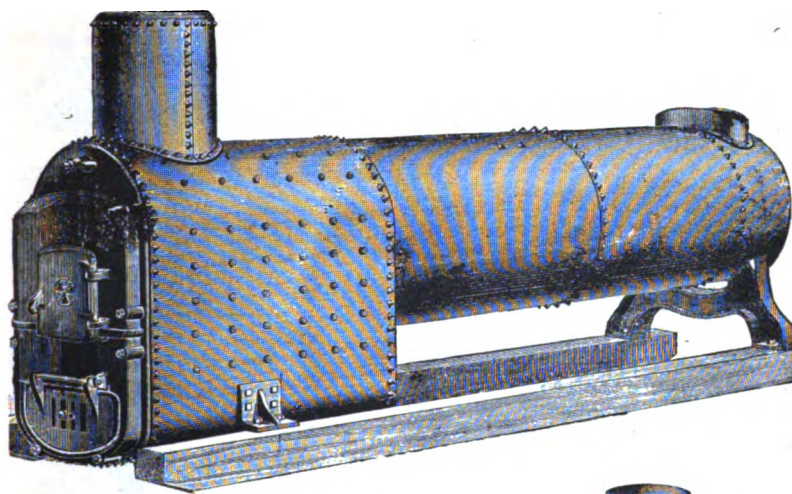


FIG. 1224.
PORTABLE BOILERS.—CLASS A.



FIG. 1225. FEED WATER HEATER.

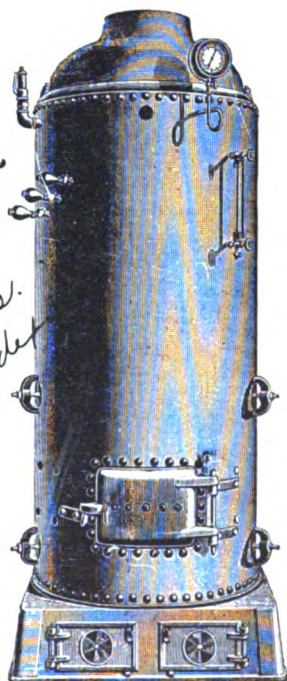


FIG. 1226. VERTICAL BOILER

FLUE CLEANERS.

These are made in great variety, and we have endeavored to show here such as are considered the best in their respective classes. In ordering Flue Cleaners always give *outside* diameter of flues.



FIG. 1227.

The above cut represents a new style of Tube Cleaner. It has been on the market about a year, and we believe it to be the best Tube Cleaner ever made. It can be used with steam or without; can be easily adjusted while in the tube by turning the handle (b) to the right or left.

Size.	1½	2	2½	3
Each.	1.50	1.80	2.00	2.25
Size.	3	3½	3¾	4
Each.	\$2.70	2.90	3.15	3.35

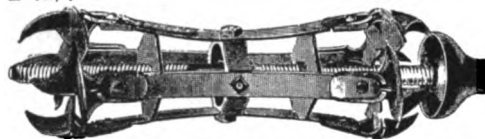


FIG. 1225. "ENGINEERS' FAVORITE."

This is a standard Flue Scraper, and perhaps the best known among engineers

Size.	1½	1¾	2	2½	2¾	3
Each.	\$1.40	1.40	1.40	1.60	1.75	1.85
Size.	3	3½	3¾	4	4½	5
Each.	\$2.10	2.25	2.45	2.60	3.00	3.35

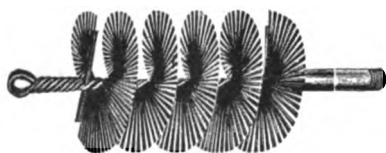


FIG. 1229. STEEL WIRE BRUSHES

The Steel Wire Brushes are sold in large quantities: they have nothing to recommend them especially, except the low price at which they are sold.

Size.	1	1½	1¾	2	2½	3
Each.	\$0.30	.30	.38	.44	.50	.57
Size.	2½	2¾	3	3½	3¾	4
Each.	\$0.63	.68	.75	.85	.90	1.00

ANDERSON'S IMPROVED FLUE BRUSH.

Somewhat similar in style to Fig. 1229, but different in form and strongly braced; furnished only in the larger sizes, from 4 to 9 inches in diameter. Price, per inch, 60 cents.

BRASS WIRE SWAB BRUSHES.

This Brush is made of light brass wires; is not good for scraping, but is used for cleaning out scale after a steam flue cleaner. Furnished in all sizes. Price, per inch, 50 cents.

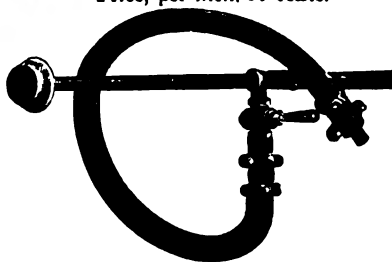


FIG. 1230. PERFECTION

STEAM FLUE CLEANER.

The Perfection Steam Flue Cleaner is one of the simplest and best devices for cleaning flues with steam; is adapted to all kinds of boilers.

No 1. \$4 20, for tubes 2 to 2½ inches.

No 2. 5 40, for tubes 3 to 3½ inches.

No 3. 6 00, for tubes 4 to 4½ inches.

The above sizes are *outside* measurements of tubes. Prices do not include hose nor valve

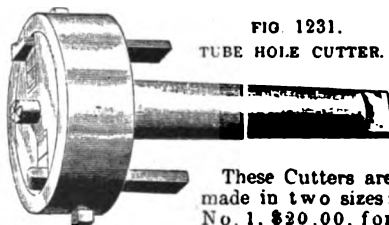
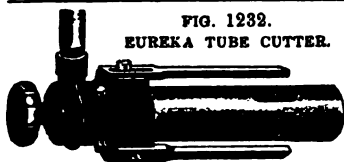


FIG. 1231.

TUBE HOLE CUTTER.

These Cutters are made in two sizes:

No. 1. \$20.00, for tubes from 2 to 4 inches inclusive; No. 2 \$24.00, for tubes from 3 to 6 inches inclusive. The adjustment for different sizes is made by packing blocks which are quickly arranged. The shanks of these are left straight, unless otherwise ordered.

FIG. 1232.
EUREKA TUBE CUTTER.

The old method of removing defective or burnt out Tubes from Boilers, was by chipping away the bead or set of tube in head-plate. This has to be done with great care, and even then it is almost impossible not to cut into the surface of head-plate hole, leaving it in a bad condition to bead or set a new tube into place.

With the Eureka Tube Cutter, Fig. 1232, a tube can be cut off inside of boiler, close to head-plate, so that it can be removed without damage to hole, leaving same in perfect condition to bead or set a new tube in place.

This Tool is also very useful for cutting off ends of tubes, as it leaves the ends ready for setting or beading. Each one is thoroughly tested before leaving factory. The only parts subject to wear are the cutting wheels, which can be replaced at small cost, and all users of steam should have one of these in the boiler room.

No. 1, \$30.00; cuts 2 and 2½ inch tubes.
No. 2, 37.60; " 3, 3½ and 3¾ "
No. 3, 43.40; " 4, 4½ " 4¾ "

TUBE EXPANDERS.

There are in general use two types of Boiler Tube Expanders: the "Roller," or what is commonly known as the Dudgeon pattern, and the "Sectional," or Spring Expander, known as the Prosser.

While there are perhaps not less than twenty different styles of Expanders on the market, we believe that over 95 per cent of the sales are of the above styles. We can furnish nearly any make desired.



FIG. 1233. "ROLLER."

The Roller Tube Expander is the style of which we sell by far the most. Until the expiration of certain patents several years ago, the prices were almost prohibitory. The old price on 2 inch was \$30.00, and on 4 inch, \$85.00. They are

now made and sold in very large numbers, and prices are within the reach of all steam users.

Size,	1	1½	1¾	1⅞	2
Each,	\$3.50	3.50	4.00	4.50	5.00
Size,	2½	2¾	2⅞	3	3½
Each,	\$6.00	7.00	8.00	9.00	10.00
Size,	3¾	4	4½	4¾	5
Each,	\$12.50	14.00	15.00	16.50	20.00

The sizes given are *outside* dimensions of Tubes.

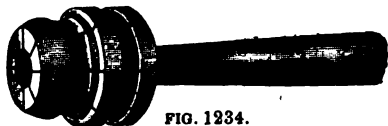


FIG. 1234.

PROSSER OR "SECTIONAL" EXPANDER.

It is claimed by many that the Sectional Expander is preferable to the Roller for new work. The greater part of our sales of this type are to Boiler Makers.

Diam.,	1½	1¾	1⅞	2
Each,	\$6.00	6.75	8.25	9.00
Diam.,	2½	2¾	2⅞	3
Each,	\$9.75	11.25	13.50	16.50
Diam.,	3¾	4	4½	5
Each,	\$22.50	24.75	27.75	31.50

The sizes given are *outside* dimensions of Tubes. When ordering Sectional Expanders give also thickness of Flue Sheet.

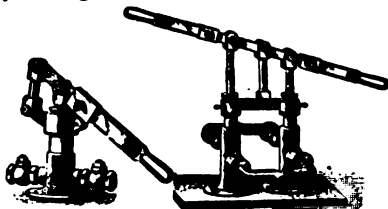


FIG. 1235.

BOILER MAKERS' TEST OR PRESSURE PUMP.

The Single Pump as shown by cut, has a revolving top admitting its being worked in any position. These Pumps will generate a cold water pressure of over 500 lbs. per square inch.

No	Single.	Double.	Diam. Cyl'n	Suct'n and Disch'g.	and Strokes.
1	\$12.30		1 in.	½ "	5 in.
2	12.80		1½ "	1 "	5 "
3	16.00	\$40.00	1½ "	1½ "	6 "
4	24.00	60.00	2 "	1½ "	8 "

BEADING TOOLS, all sizes, 75 cts. each.

CAULKING TOOLS, 50 cts. each.

CONICAL RIVET SETS, ½, ¾ & 1 in. \$1.50 each

For Boiler Tubes, see Index.

STEAM PUMPS.

There are any number of pump manufacturers who modestly (?) claim the proud distinction of being the makers of the Best—with a big B—Pumps in the market. We have never been able to find out who makes the *best*, because, just when we were about on the point of satisfying ourselves, some other Pump man would come along, and, while he might not convince us that *his* pumps were the best, would at least give us the impression that they were as good as any.

Seriously, however, there are a goodly number of makers of pumps, whose goods can be relied upon as being first-class.

The line of Pumps shown here is made by the Snow Steam Pump Works. Each and every Pump that we sell is fully guaranteed to properly perform the service for which it is warranted.

Besides the few styles shown here, and others that are described, we can furnish a great variety of special Pumps and Air Compressors, and solicit correspondence regarding anything in this line

DUPLIX PLUNGER PUMPS.

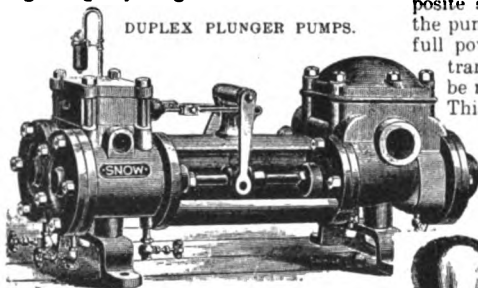


FIG 1238

SIZES

4½x2½x4, 5½x3½x5 6x4x6

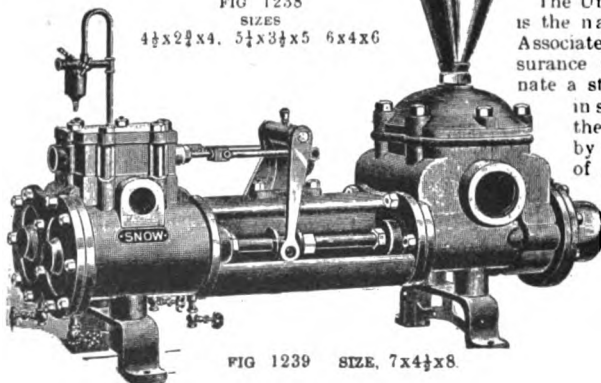


FIG 1239 SIZE, 7x4½x8.

THE SNOW "DUPLIX" PLUNGER PUMP

Figs. 1238 and 1239 represent Duplex Steam Pumps. They are intended for all service when the requirements do not exceed a working pressure of 150 lbs. per square inch. These pumps are fitted with two double-acting plungers, rubber valves, brass seats, guards and springs, suitable for pumping hot or cold water.

Price	Diam. Steam Cyl's	Diam. Water Plungers	Length of Stroke	Gallons per Minute
\$30.00	2½	1½	2	5 to 9
45.00	3	2	3	5 to 20
71.25	4½	2½	4	20 to 40
86.25	5½	3½	5	40 to 80
105.00	6	4	6	65 to 100
161.25	7	4½	8	110 to 165

THE SNOW "FIRE" PUMP

The importance of having a reliable Fire Pump can not be overestimated. It is on just such emergencies as a fire pump meets, that the Snow valve motion shows its superiority.

Each valve being controlled by its opposite steam piston, it is impossible for the pump to be on "dead center" and the full power of the steam piston being transferred to the valve rod there can be no sticking of the valve to its seat. This is a valuable point, for, as is often the case, a fire pump remains unused for months at a time and a pump that depends upon throwing its valve by tappet motion is unreliable. Single cylinder pumps are therefore unsuited

THE SNOW

"UNDERWRITERS' FIRE" PUMP

The Underwriter Fire Pump is the name adopted by the Associated Factory Mutual Insurance Companies to designate a steam fire pump built in strict accordance with the specifications issued by them, bearing date of June 1st, 1891

THE SNOW "COMPOUND" STEAM PUMP.

Where a saving in fuel is desired this combination of high and low pressure cylinders is recommended. The

steam acting through the entire stroke upon the smaller piston expands upon the larger during the return stroke. This is in effect the same as using a cut-off device and results in a saving of from 20 to 30 per cent. As compounding cylinders require less steam, the size and cost of boilers may be materially lessened.

Compound cylinders are used extensively on Hydraulic Elevator Pumps, Fire, Pressure and Mine Pumps; also on pumps designed for the water supply of small cities and towns.

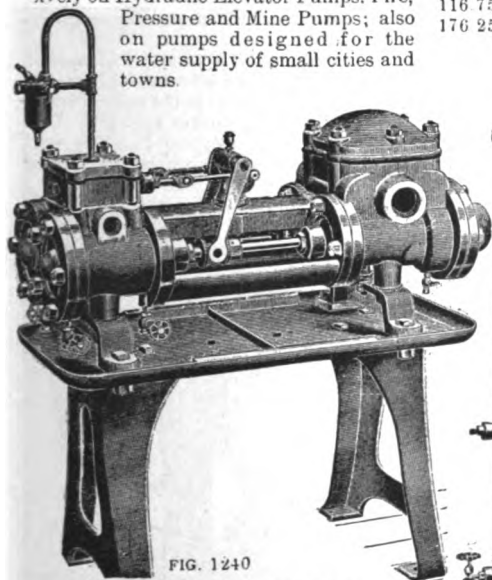


FIG. 1240

THE SNOW "BOILER FEED" PUMP

The above cut represents a Boiler Feed Pump mounted upon a cast iron table or stand. The steady demand for a cheap and durable foundation, raising the pump to a convenient height, has led to its design. The cleanliness resulting from having the drip pan in combination with the stand will be appreciated by all engineers who desire to keep their engine-rooms and boiler-houses neat.

The drip pan can be emptied by means of a drain.

Price.	Diam. Steam Cylinders.	Diam Water Plung'.	Length of Stroke.	Gallons per Minute
\$50.25	3 in.	2 in.	3 in.	8 to 20
77.25	4½"	2½"	4 "	20 to 40
93.75	5½"	3½"	5 "	40 to 80
112.50	6 "	4 "	6 "	70 to 100

Snow Boiler Feed Pump, with Lever Attachment, for filling boiler by hand when there is no steam. Similar in style to Fig 1240, but without stand

Price	Diam. Steam Cylinders	Diam Water Plung'.	Length of Stroke	Gallons per Minute
\$48.75	3 in.	2 in.	3 in.	8 to 20
78.75	4½"	2½"	4 "	20 to 40
93.75	5½"	3½"	5 "	40 to 80
116.75	6 "	4 "	6 "	70 to 100
176.25	7 "	4½"	8 "	110 to 165

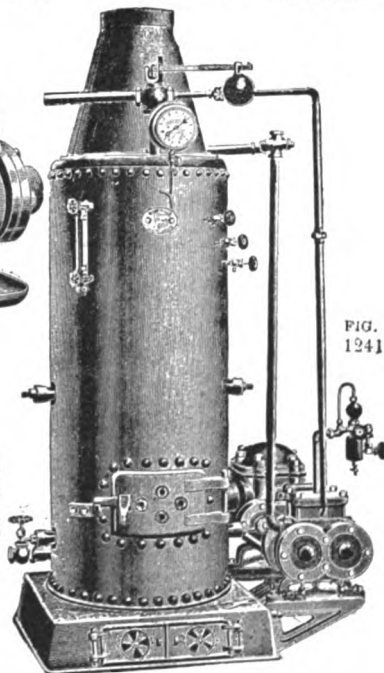


FIG. 1241

THE SNOW "STEAM PUMP AND BOILER"

This combination Steam Pump and Boiler is intended for use where a complete pumping plant is in demand.

The most approved form of portable boiler with the Snow Steam Pump provides a pumping station for Railroads, Quarries, Residences, etc.

THE SNOW "PISTON PRESSURE" PUMP.

This pump is designed for working against heavy pressures ranging from 300 to 1,000 lbs. per square inch.

It differs from the regular "Pressure"

SNOW'S PUMPS—Continued.

pump in that it has no outside packed plungers, but a brass piston packed with fibrous packing.

These pumps are used extensively on Oil Lines and are especially adapted for pumping heavy oil.

THE SNOW "PRESSURE" PUMP

This pump is designed to meet the severe service incident with delivering liquids under heavy pressure.

SNOW INDEPENDENT CONDENSING APPARATUS

The Independent Condensing Apparatus can be attached to any engine, and by its operation will effect a saving in fuel of from 20 to 30 per cent, according to circumstances

THE SNOW "MINE" PUMP

For this form of service the plunger form of pump is recommended, especially where the water is gritty or sulphurous.

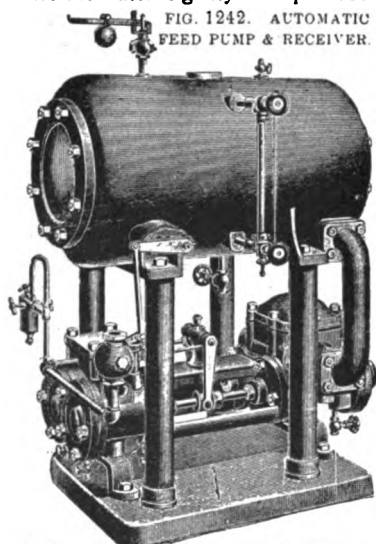


FIG. 1242. AUTOMATIC
FEED PUMP & RECEIVER.

In the draining of steam coil radiators, etc., it is important to have an automatic arrangement, not only as a source of economy, but to avoid the snapping and water-hammer heard where traps with an intermittent action are used. The delivering of the water of condensation to the boiler, when in its hottest condition, considerably increases the efficiency of the heating plant.

THE SNOW "MARINE" PUMP.

It often happens that the requirements of this service demand a pump occupying the least possible floor space and head room. To this end a pump extraordinarily strong and simple, with all external parts of easy access has been designed. Great care is taken in its construction and the careful selection of material, and the superior workmanship produces a pump requiring the least possible attention and repair.

This pump may be used to advantage as an independent feed where the steam pressures are high, as is the case in triple and quadruple expansion engines. This pattern of Snow Marine Pump is well adapted for fire service where weight and space must be economized.

Send for complete descriptive circulars.

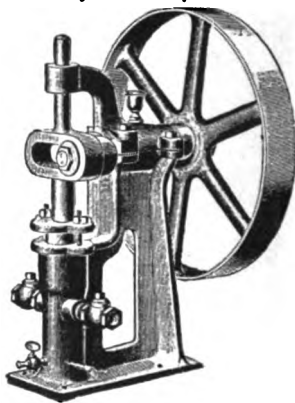


FIG. 1243

STANDARD POWER BOILER FEED PUMP.

This shows a Boiler Feed Pump, which is neat in design, self-contained, simple in action, durable and reliable. They occupy very little space, and any engineer can easily set and operate them.

No	Price	Size of Piston	Stroke	Size of Pulley.	Fitted for Pipe	H. P of Boil'r
1	\$12.50	1	2	12x2	$\frac{1}{2}$	3
2	16.00	1 $\frac{1}{2}$	2 $\frac{1}{2}$	14x2	$\frac{3}{4}$	5
3	19.20	1 $\frac{1}{2}$	3	16x3	$\frac{1}{2}$	10
4	22.40	1 $\frac{1}{2}$	3	16x3	$\frac{3}{4}$	15
5	25.60	2	3	18x4	1	30
6	30.40	2 $\frac{1}{2}$	3	18x4	1	45
7	48.00	2	6	22x4	1 $\frac{1}{2}$	60
8	56.00	2 $\frac{1}{2}$	6	Geared	1 $\frac{1}{2}$	80
9	68.00	3	6	Geared	1 $\frac{1}{2}$	100

HANGERS, PILLOW BLOCKS, ETC.

FIG. 1244.

We present here a line of small Fixtures suitable for model work, or for running light machinery. Shafting suitable to use with these fixtures described and priced on page 356.

ADJUSTABLE HANGERS.

FIG. 1245.

Diam. Shaft.	Drop.	Each.
$\frac{1}{2}$	1 to $1\frac{1}{2}$	\$0.40
$\frac{3}{4}$	2 to $2\frac{1}{2}$	.50
$1\frac{1}{2}$	$3\frac{1}{2}$ to 5	.60
$1\frac{3}{4}$	9 to $2\frac{1}{2}$	.60
$2\frac{1}{4}$	3 to 4	.80
$2\frac{3}{4}$	$5\frac{1}{2}$ to 8	1.00
$3\frac{1}{4}$	3 to $4\frac{1}{2}$	1.15
$4\frac{1}{4}$	$4\frac{1}{2}$ to 6	1.35
$4\frac{3}{4}$	6 to $8\frac{1}{2}$	1.50

FIG. 1246.
FLAT FACED.FIG. 1247.
GROOVED.**FIG. 1246. IRON PULLEYS.**

Face.	Diam.	Hole.	Each.	Face.	Diam.	Hole.	Each.
1	$1\frac{1}{2}$	$\frac{1}{2}$	\$0.40	$1\frac{1}{2}$	2	$\frac{1}{2}$	\$0.50
1	3	$\frac{1}{2}$	.45	$1\frac{1}{2}$	3	$\frac{1}{2}$	.70
1	3	$\frac{1}{2}$	.55	$1\frac{1}{2}$	4	$\frac{1}{2}$	.85
1	4	$\frac{1}{2}$	.60	$1\frac{1}{2}$	5	$\frac{1}{2}$	1.00
1	5	$\frac{1}{2}$	.75	$1\frac{1}{2}$	6	$\frac{1}{2}$	1.25
1	6	$\frac{1}{2}$	.90	$1\frac{1}{2}$	8	$\frac{1}{2}$	1.50
1	8	$\frac{1}{2}$	1.25	$1\frac{1}{2}$	10	$\frac{1}{2}$	1.75
1	10	$\frac{1}{2}$	1.50	$1\frac{1}{2}$	12	$\frac{1}{2}$	2.00

FIG. 1247. GROOVED IRON PULLEYS.

For round belt: all have $\frac{1}{2}$ inch hole.

Diam.	$1\frac{1}{2}$	3	4	5	6	8	10
Each,	\$0.45	.50	.65	.75	.85	1.00	1.50

SMALL BRASS PULLEYS.

Diam.	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4	5
Face,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Hole,	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Each,	\$0.30	.40	.50	.55	.75	1.00	1.15



FIG. 1248.

SOLID BRASS JOURNAL BOXES.

Diam. Hole,	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Each,	\$0.20	.25	.30



FIG. 1249. IRON PILLOW BLOCK.

Diam. Hole,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Bottom to Center,	$\frac{1}{2}$	$\frac{1}{2}$	1	1
Each,	\$0.40	.45	.50	.60

**COUPLINGS.**

Size Shaft,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
FIG. 1250. Each,	\$0.30	.40	.60	1.00

**COLLARS.**

Size Hole,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
1951. Each,	\$0.25	.30	.35	.45

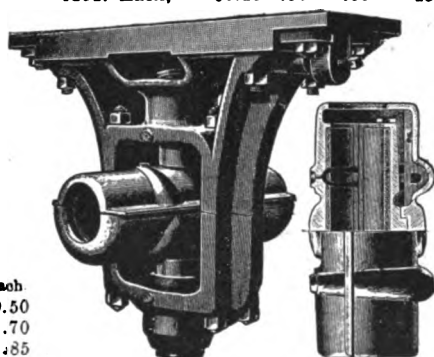


FIG. 1252. RING OILING BEARINGS.

We illustrate above a system of lubricating shafting by tempered steel rings. These rings are bent to circles enough larger than the diameter of their shafts to allow the lower portion of them to run constantly in oil. As the shafts revolve, the rings revolve on them and carry up to the journals sufficient oil to lubricate them thoroughly; any surplus of oil is removed by brass scrapers or wipers at each end of the bearings, and drops back into the oil receptacle.

We are prepared to furnish a full line of Hangers of this style. Prices and further description upon application.

HANGERS.

The following is an article on Hangers by "Chordal," and printed originally in the *American Machinist* :

"Some years ago—a good many, happily—if a man happened to have a line shaft, and found that his steam gauge must show twenty pounds before he could revolve the shaft, he thought little of it. When he put up the building, he put up the clumsy shaft with its common boxes bolted squarely up against posts. The shaft was put up in line, and if it staid so, well and good, and if it didn't stay so, well and good. Experience with shafting developed the fact that it was easy to make a good box, but very difficult to get it into line, if of ordinary bolted box form, and that settling floors, etc., would soon disarrange all the fine adjustments. The first step towards a nice device was

approximate accuracy, and then brought into line by means of the vertical and horizontal adjusting screws.

Such hangers have never been improved upon, and probably never will be. They contain erective and corrective adjustments and self-adjusting features, as far as attainable. Some makers have adopted the ball-and-socket hanger on account of its peculiarly solid form, simplicity of structure and low cost, and it is often copied under the impression that it possesses all the virtues of the old gimbal hanger. When the ball-and-socket hanger is up and in line, it is the real equivalent of the gimbal hanger, but it lacks an important feature of convenience in erection and re-adjustment. The horizontal adjusting movement is omitted altogether, and a substitute found in sledge-hammer manipulations."

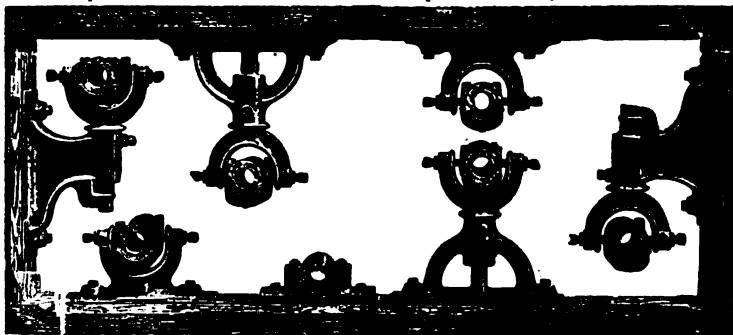


FIG. 1252. AMERICAN TOOL & MACHINE CO'S HANGERS.

to arrange the boxes in a holder, so that the proper adjustment could be made by set screws. This rendered erection an easy matter, and allowed the boxes to be brought into general line, but it failed to provide for bringing every part of every box into collimation. That is, a true line might cut the axis of every box at some point of the box's length, but there was nothing to prevent the axis of each box assuming independent angles. The adjustment provided consisted of vertical and horizontal movements by screws, and the fault above referred to was obviated by designing the box in gimbal form, so that each box was universally self-adjusting, so far as its individual axis was concerned. Such boxes or hangers could be put up in a position of

The above type of Hanger was originated, we believe, by the American Tool & Machine Co., and has been made by this concern for upwards of twenty-five years. We consider it the best Hanger for general use that is made. They are very heavy and strong, and lined with best babbit metal; the boxes are self-oiling and provided with properly shaped oil-ways. We have in use in our own shops over 250 of these Hangers, and our main line shaft has run as long as sixteen months with one filling of Houghton's machine oil, Cosmolubric No. 2 (see page 303).

As will be seen by the cut, these Hangers can be used with either side up, as the sustaining bolt in the yoke supports the load in either direction. They can also be adjusted lengthwise and sidewise.

PRICE LIST DROP HANGERS.

Diam. Shaft.	Drop in inches.	Each.	Diam. Shaft.	Drop in inches.	Each.
1 $\frac{1}{4}$	10	\$2.40	2 $\frac{1}{4}$	12	\$4.50
"	12	2.50	"	14	4.80
"	14	2.75	"	16	5.20
"	16	2.85	"	18	5.60
"	18	3.00	"	20	6.00
"	20	3.50	"	24	6.75
1 $\frac{1}{2}$	10	2.60	"	30	7.50
"	12	2.70	2 $\frac{3}{4}$	14	6.20
"	14	2.80	"	16	6.60
"	16	3.00	"	18	7.00
"	18	3.50	"	20	7.50
"	20	3.75	"	24	8.00
1 $\frac{3}{4}$	10	3.00	"	30	9.50
"	12	3.20	2 $\frac{1}{2}$	16	9.50
"	14	3.40	"	18	10.00
"	16	3.60	"	20	10.50
"	18	3.80	"	24	12.50
"	20	4.10	"	30	14.50
"	24	4.25	3 $\frac{1}{4}$	18	17.00
"	30	5.00	"	20	18.00
1 $\frac{1}{2}$	10	3.70	"	24	19.50
"	12	3.80	"	30	21.50
"	14	4.00	3 $\frac{1}{2}$	18	22.00
"	16	4.20	"	20	25.00
"	18	5.50			
"	20	6.00			

PRICE LIST POST HANGERS.

Diam. Shaft.	Distance from Post to Center of Shaft.	Each.
1 $\frac{1}{4}$	6 inches	\$2.40
1 $\frac{1}{2}$	6 "	2.80
1 $\frac{3}{4}$	6 "	3.50
1 $\frac{1}{2}$	7 $\frac{1}{2}$ "	4.20
2 $\frac{1}{4}$	7 $\frac{1}{2}$ "	4.80
2 $\frac{1}{2}$	7 $\frac{1}{2}$ "	6.20
2 $\frac{3}{4}$	9 "	9.00
3 $\frac{1}{4}$	10 $\frac{1}{2}$ "	12.00
3 $\frac{1}{2}$	12 "	15.00

PRICE LIST FLOOR HANGERS.

Diam. Shaft.	Height from Floor to Center of Shaft.	Each.
1 $\frac{1}{4}$	4 $\frac{1}{2}$ inches	\$2.00
1 $\frac{1}{2}$	5 "	2.25
1 $\frac{3}{4}$	5 $\frac{1}{2}$ "	2.75
1 $\frac{1}{2}$	6 "	3.25
2 $\frac{1}{4}$	6 $\frac{1}{2}$ "	3.75
2 $\frac{1}{2}$	7 "	4.50
2 $\frac{3}{4}$	8 "	6.50
3 $\frac{1}{4}$	9 "	9.50
3 $\frac{1}{2}$	10 "	12.00

PEDESTAL BOXES.

Diam. Shaft.	Height from Floor to Center of Shaft.	Each.
1 $\frac{1}{4}$	1 $\frac{1}{2}$ inches	\$2.00
1 $\frac{1}{2}$	1 $\frac{1}{2}$ "	2.25
1 $\frac{3}{4}$	2 "	2.75
1 $\frac{1}{2}$	2 $\frac{1}{2}$ "	3.25
2 $\frac{1}{4}$	2 $\frac{1}{2}$ "	3.75
2 $\frac{1}{2}$	3 "	4.50
2 $\frac{3}{4}$	3 $\frac{1}{2}$ "	5.50
3 $\frac{1}{4}$	3 $\frac{1}{2}$ "	8.00
3 $\frac{1}{2}$	3 $\frac{3}{4}$ "	10.00

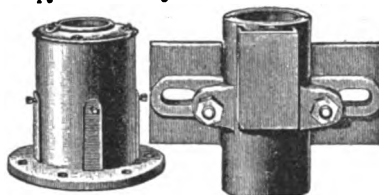


FIG. 1253

FIG. 1254.

FLOOR BOX. VERTICAL SHAFT BOX.

The Floor Box, Fig. 1253, is used for vertical shaft running through floor; has Adjustable Self-oiling bearings, and is protected against dust by a casing.

Each, \$2.75 3.40 4.05 4.65 5.75 7.30
Diam. 1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2 $\frac{1}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$

The Vertical Shaft Box, Fig. 1254, is similar to a Rigid Pillow Block excepting that the reservoir is arranged for the box to be used in a vertical position.

Diam. 1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2 $\frac{1}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$
Each, \$0.85 1.00 1.20 1.50 1.80 2.10 2.85

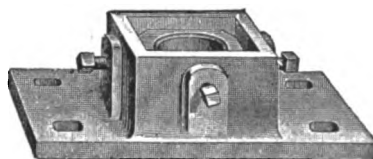


FIG. 1255. STEP BOX.

The Step Box, Fig. 1255, is used at the base of upright shafts. These Boxes are adjustable and are furnished with brass bearings.

Diam. 1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2 $\frac{1}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$
Each, \$3.30 3.70 4.25 4.80 5.60 7.85

TORN CATALOGUES.—Every article in this catalogue is very plainly described, either by figure number, regular number, or name; and we beg our customers not to cut or tear out pages, or parts of pages, as this mutilates the book, and when done to any extent, destroys it for reference.

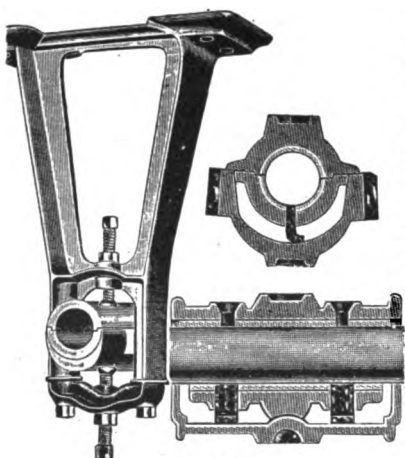


FIG. 1256.

DOUBLE BRACE HANGERS.

Diam.	Drop in	Each.	Diam.	Drop in	Each.
Shaft.	inches.		Shaft.	inches.	
1 $\frac{3}{8}$	9 to 11	\$1.72	2 $\frac{7}{8}$	11 to 13	\$4.48
"	11 to 13	1.88	"	13 to 15	4.80
"	13 to 15	2.08	"	15 to 17	5.20
"	15 to 17	2.24	"	17 to 19	5.40
1 $\frac{7}{8}$	9 to 11	1.98	"	19 to 21	5.60
"	11 to 13	2.14	"	23 to 25	6.24
"	13 to 15	2.34	2 $\frac{1}{8}$	11 to 13	6.70
"	15 to 17	2.50	"	13 to 15	7.22
"	17 to 19	2.56	"	15 to 17	7.70
"	19 to 21	2.68	"	17 to 19	7.88
1 $\frac{1}{2}$	9 to 11	2.24	"	19 to 21	8.06
"	11 to 13	2.40	"	23 to 25	9.04
"	13 to 15	2.60	3 $\frac{1}{8}$	15 to 17	11.56
"	15 to 17	2.76	"	17 to 19	11.82
"	17 to 19	2.96	"	19 to 21	12.08
"	19 to 21	3.16	"	23 to 25	13.40
1 $\frac{3}{4}$	11 to 13	3.08	"	29 to 31	15.08
"	13 to 15	3.30	3 $\frac{1}{2}$	17 to 19	14.18
"	15 to 17	3.56	"	19 to 21	14.44
"	17 to 19	3.68	"	23 to 25	15.86
"	19 to 21	3.82	"	29 to 31	17.16
"	23 to 25	4.24	"	35 to 37	19.56
"	29 to 31	4.68	4 $\frac{1}{8}$	19 to 21	18.20
2 $\frac{1}{4}$	11 to 13	3.74	"	23 to 25	19.50
"	13 to 15	4.06	"	29 to 31	21.32
"	15 to 17	4.32	"	35 to 37	24.12
"	17 to 19	4.46	4 $\frac{1}{2}$	23 to 25	24.18
"	19 to 21	4.60	"	29 to 31	27.56
"	23 to 25	5.18	"	35 to 37	30.36

The above Hangers have many good features, and we can recommend them as

being very much superior to the majority of Hangers sold. They are Adjustable and Self-oiling. The Boxes used are four diameters long, are babbitted with a metal best suited for moderate or high speed, which is carried to the extreme ends of the bearing, which prevents the cutting of shaft by the strips of cast iron which are sometimes left in Hanger boxes. The boxes are strictly Self-oiling, and require attention only at long intervals dependent upon the speed of shafts and quality of oils used. The Boxes are interchangeable and reversible, so that the Hangers may be used as Floor Stands when desired.

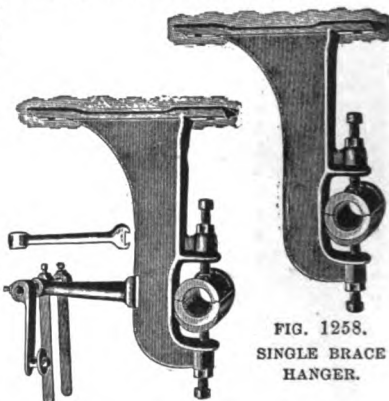


FIG. 1258.

SINGLE BRACE HANGER.

FIG. 1257.

SINGLE BRACE HANGERS.

The Single Brace Hanger shown above is Adjustable and Self-oiling. There are a great many Hangers of this type sold, for the reason that they can be made and sold cheaper than any other style.

We can furnish the Single Brace Hanger, as shown in cut, Fig. 1257, with Shifter, Arms, Rods, Belt Guides, Collars and Knobs. When these are wanted, add for each countershaft 1 $\frac{1}{4}$ or under, \$1.00; and from 1 $\frac{1}{4}$ to 2 $\frac{1}{4}$, \$1.50.

Diam.	Drop in	Each.	Diam.	Drop in	Each.
Shaft.	inches.		Shaft.	inches.	
1 $\frac{1}{4}$	8	\$1.26	1 $\frac{3}{4}$	14	\$1.72
"	10	1.34	1 $\frac{7}{8}$	8	1.66
"	12	1.40	"	10	1.78
1 $\frac{3}{8}$	8	1.40	"	12	1.88
"	10	1.52	"	14	2.02
"	12	1.62	"	16	2.10

Diam. Shaft.	Drop in inches.	Each.	Diam. Shaft.	Drop in inches.	Each.
1 $\frac{1}{4}$	8	\$1.84	1 $\frac{1}{4}$	18	\$3.10
"	10	1.96	2 $\frac{1}{4}$	14	3.24
"	12	2.16	"	16	3.40
"	14	2.28	"	18	3.54
"	16	2.38	"	20	3.68
1 $\frac{1}{2}$	10	2.56	2 $\frac{1}{2}$	14	4.08
"	12	2.78	"	16	4.22
"	14	2.92	"	18	4.40
"	16	3.00	"	20	4.60



FIG. 1259. SOLID JOURNAL BOXES. Cast in one piece; bearings bored; not babbitted.

Diam. Each.	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{2}$
	\$0.50	.60	.70	.80	1.00

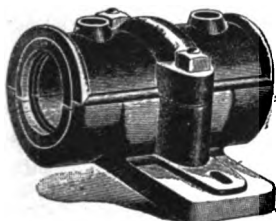


FIG. 1260. SELF-OILING RIGID PILLOW BLOCK.

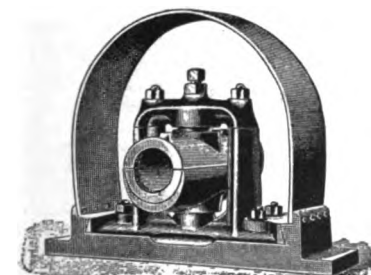


FIG. 1261. WALL FRAME FOR PILLOW BLOCK.



FIG. 1262. BASE PLATE FOR PILLOW BLOCK.

We can furnish the Wall Frames or Boxes and Base Plates, as shown above, for all sizes Pillow Blocks, from 1 $\frac{1}{4}$ to 5 $\frac{1}{4}$ inches. Prices upon application.

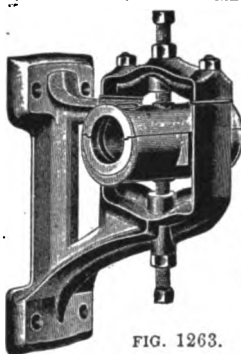


FIG. 1263.

Diam. Shaft.	Each.	Back to Cent. Shaft
1 $\frac{1}{4}$	\$1.59	4
1 $\frac{1}{2}$	1.72	4 $\frac{1}{2}$
1 $\frac{3}{4}$	2.08	4 $\frac{1}{2}$
2	2.56	5 $\frac{1}{2}$
2 $\frac{1}{4}$	3.24	5 $\frac{1}{2}$
2 $\frac{1}{2}$	4.08	6 $\frac{1}{2}$
2 $\frac{3}{4}$	6.48	8
3	10.48	9 $\frac{1}{2}$
3 $\frac{1}{4}$	15.60	10 $\frac{1}{2}$
4	20.20	13
4 $\frac{1}{4}$	25.80	13

ADJUSTABLE POST HANGER. SELF-OILING.

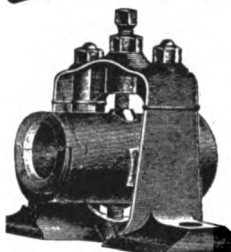


FIG. 1264.

SHORT DROP HANGER OR PILLOW BLOCK.

Diam. Shaft.	Each.	Cent. Shaft Bot'm
1 $\frac{1}{4}$	\$1.68	3 $\frac{1}{2}$
1 $\frac{1}{2}$	1.92	4 $\frac{1}{2}$
1 $\frac{3}{4}$	2.36	4 $\frac{1}{2}$
2	2.96	4 $\frac{1}{2}$
2 $\frac{1}{4}$	3.72	4 $\frac{1}{2}$
2 $\frac{1}{2}$	4.52	5 $\frac{1}{2}$
2 $\frac{3}{4}$	6.76	6 $\frac{1}{2}$
3	10.12	7
3 $\frac{1}{4}$	14.32	7 $\frac{1}{2}$
4	19.04	7 $\frac{1}{2}$
4 $\frac{1}{4}$	24.20	8 $\frac{1}{2}$

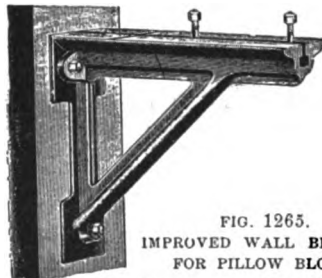


FIG. 1265. IMPROVED WALL BRACKET FOR PILLOW BLOCK.

Suitable for Figs. 1260 and 1264.

Diam. Shaft.	Each.	Wall to Center of Shaft.	Diam. Shaft.	Each.	Wall to Center of Shaft.
1 $\frac{1}{4}$	\$2.30	12 in	2 $\frac{1}{4}$	\$3.50	12 in.
to	2.50	18 "	to	3.90	18 "
1 $\frac{1}{2}$	2.70	24 "	3 $\frac{1}{4}$	4.30	24 "
1 $\frac{3}{4}$	2.40	12 "	3 $\frac{1}{2}$	8.40	12 "
to	2.60	18 "	to	9.00	18 "
2	2.80	24 "	3 $\frac{3}{4}$	10.10	24 "
2 $\frac{1}{4}$	2.50	12 "	3 $\frac{1}{2}$	9.20	12 "
to	2.70	18 "	to	9.70	18 "
2 $\frac{3}{4}$	3.00	24 "	4 $\frac{1}{4}$	11.00	24 "

STEEL SHAFTING.

We have in the past sold, used, and in many ways very thoroughly tested Steel Shafting manufactured by nine different concerns. For some time past we have been handling the Jones & Laughlin's Cold Rolled Shafting.

In our judgment, this concern makes the best Shafting on the market to-day. We will guarantee all Shafts to be absolutely round, straight and true to size.

We give in the following table a list of the sizes of Shafts that we mean to have in stock at all times:

Diam.	Per ft.	Diam.	Per ft.	Diam.	Per ft.
$\frac{1}{2}$	\$0.03 $\frac{1}{2}$	$1\frac{1}{4}$	\$0.16	2	\$0.49
$\frac{3}{4}$	.04	$1\frac{1}{2}$	.18	$2\frac{1}{2}$	.53
$\frac{7}{8}$	.04 $\frac{1}{2}$	$*1\frac{3}{4}$	.19	$*2\frac{3}{4}$	.56
$1\frac{1}{8}$	.05	$1\frac{7}{8}$	.21	$2\frac{7}{8}$	.61
$1\frac{1}{4}$	.06	$1\frac{9}{8}$	.23	$2\frac{9}{8}$	.66
$1\frac{3}{8}$	.07	$1\frac{5}{4}$	.24	$*2\frac{5}{4}$	.68
$1\frac{1}{2}$	.08	$*1\frac{1}{2}$	.25	$2\frac{1}{2}$	.75
$1\frac{5}{8}$	.09	$1\frac{3}{4}$	.28	$2\frac{3}{4}$	.81
$1\frac{7}{8}$	.10	$1\frac{1}{4}$	.33	$2\frac{1}{4}$	.90
2	.12	$*1\frac{1}{4}$	.35	$*2\frac{1}{4}$	1.00
$2\frac{1}{8}$	.13	$1\frac{1}{2}$	.38	3	1.08
$2\frac{1}{4}$	.14	$1\frac{3}{4}$	.41	$*3\frac{1}{4}$	1.53
$2\frac{3}{8}$	.15	$*1\frac{3}{4}$	.43	$*3\frac{3}{8}$	2.05

LENGTHS OF SHAFTS.

We give below a list of the lengths of shafts carried in stock.

We carry all sizes in above table in 6 ft. lengths.

The following sizes in 8, 10, 14, 18, 20 and 24 ft. lengths:

$\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{5}{4}$, $2\frac{1}{4}$, $2\frac{3}{4}$, $2\frac{7}{8}$

The following sizes in 12 and 16 ft. lengths:

$\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{8}$, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{5}{8}$, $1\frac{7}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{5}{4}$, $1\frac{7}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{5}{8}$, $1\frac{7}{8}$, $2\frac{1}{4}$, $2\frac{3}{4}$, $2\frac{7}{8}$, $3\frac{1}{4}$, $3\frac{3}{4}$.

As will be seen, our shortest stock length is 6 ft., and when we cut to shorter lengths, at store, we charge extra for cutting, as follows:

Diameter, $\frac{1}{2}$ to $\frac{3}{4}$ $\frac{1}{2}$ to $1\frac{1}{4}$ $\frac{1}{2}$ to $1\frac{1}{2}$
Each Cut, 5 cts. 10 cts. 15 cts.

Diameter, $1\frac{1}{8}$ to $2\frac{1}{4}$ $2\frac{1}{4}$ to $2\frac{3}{4}$ 3 to $3\frac{3}{4}$
Each Cut, 20 cts. 25 cts. 35 cts.

When we ship direct from mill we make no charge for cutting except when lengths are under 2 ft.

The sizes marked with an asterisk (*), are recognized as the standard sizes, and are in most common use. All our Hangers, Pillow Blocks, Couplings, etc., etc., are made to fit these sizes. It is often the case, that when a shaft is designated as being 2 inch, $1\frac{1}{4}$ is meant. This is considered a curious matter by the younger generation, and we have often been called upon to explain the reason, which, briefly, is as follows:

Not so many years ago, before the days of Cold-rolled and Hot-polished shafting, all shafting was turned. In those days the rough bar iron was rolled from $\frac{1}{4}$ to $\frac{1}{8}$ of an inch over-size, and shafting was turned down from bar iron. A 2 inch bar would turn down nicely to $1\frac{1}{4}$, and other sizes in similar proportions. The rough bars were not usually kept in stock in the larger sizes (say from $1\frac{1}{4}$ inch upwards), in less than $\frac{1}{4}$ inch variations, so that if a size like $2\frac{1}{4}$ inch exact were required, it would be necessary to use the $2\frac{1}{4}$ inch rough stock, making the shaft cost considerable extra, both in material and labor. With the new processes it is, of course, a simple matter to make a shaft of any exact size, but by common consent, the old standard of sizes has never been changed, although we occasionally find a critic of the "Higher School" who tries to revolutionize the good old practice by insisting upon having "Exact" sizes, say 2, $2\frac{1}{4}$ or 3 inch, instead of $1\frac{1}{4}$, $2\frac{1}{4}$ or $2\frac{3}{4}$ inch, but who only succeeds in making a lot of work and expense, without doing either himself or others any good.

However, in connection with the foregoing we deem it best to state that we fill orders as specified, and an order for 2 inch shafting would be filled with shafting measuring exactly two inches in diameter, which would, of course, be $\frac{1}{8}$ of an inch too large to fit the hangers and other fixtures which we carry in stock.

OTHER SHAPES—Under the head of Square Steel (see index), we describe a line of Cold-Rolled Steel Stock, similar in finish to the Steel Shafting priced here. This Steel can be furnished in various shapes, Square, Flat, and different forms for Finger Bars, Knife Backs, Engine Guides, etc., etc. The Square Cold-Rolled Steel we carry in stock; the other shapes are furnished to order, some sizes being carried in stock at the mill.

OTHER SIZES.

The following sizes are carried in stock at the mill, and can be furnished when desired:

Diam.	Per ft.	Diam.	Per ft.	Diam.	Per ft.
1 1/4	\$0.05	1 1/2	\$0.25	3 1/2	\$1.34
1 1/2	.06	1 3/4	.27	3 3/4	1.44
1 3/4	.09	1 7/8	.31	3 7/8	1.56
1 7/8	.13	1 15/16	.40	2 1/2	1.74
1 15/16	.14	2 1/8	.51	3 1/2	1.80
2 1/8	.15	2 1/4	.64	3 3/4	1.86
2 1/4	.17	2 3/8	.78	4	2.13
2 3/8	.18	2 1/2	.86	4 1/2	2.40
2 1/2	.20	3 1/8	1.25	4 3/4	2.63

MACHINERY SHAFTS.

We furnish a great many machine manufacturers with Shafting, cut to exact length; have sold one manufacturer of blacksmiths' drills over two thousand pieces, ranging in diameter from 1/4 to 1 1/2 inches, and in lengths from 6 1/2 to 19 1/2 inches. These shafts complete, costing less than the time usually spent turning up ordinary bar iron or steel. We make special prices on these Shafts, and should be pleased to receive inquiries.

LARGE FORGED SHAFTS.

We are prepared to furnish, at short notice, large Shafts of any diameter up to 12 inches, and of any length to 30 ft. Prices quoted upon application.

KEY-SEATING.

For many purposes, long Key-seats in shafts are required. We can furnish shafts key-seated in any manner, and will name prices for this work upon application.

SHAFT-COUPPLINGS.

The following article entitled "The Best Shaft Couplings" is a clipping from the "Iron Trade Review."

When flanged couplings are forced tightly on the shaft, and keyed carefully, so that the keys bind radially outward and inward and do not fit on their sides, they are good couplings. These conditions, unfortunately, do not prevail to the same extent that flanged couplings do, and they sometimes



FIG. 1266.

FLANGE COUPLING give trouble of a very grievous kind. At first where such couplings are badly fitted, shafting will

[32]

not run true. Afterward the line will spread, because the shaft will slip out of the couplings endwise, and again the shaft will grind out the coupling, wear out the key and its seat, and ruin in a few days what it costs much money and trouble to mend.

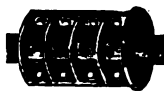


FIG. 1267.

CLAMP COUPLING.

factory under heavy duty. There are, however, a great many good couplings.—*Albert D. Pentz.*



FIG. 1268.

COLLINS' PATENT COUPLINGS.

We agree with what Mr. Pentz has said in the foregoing article, that there are a great many good Couplings. However, there are a great many Couplings that are not so good.

We have sold the Collins' Coupling, illustrated above, for a number of years, and have also sold a great many other styles and makes of Couplings; but the Collins' has given our customers and ourselves as well, better satisfaction than any other. They are accurate and well made.

The Sleeve, which is in halves, is bored somewhat smaller than the diameter of the shaft. When the cone rings are driven well home by a copper or babbitt metal hammer or block of hard wood and locked by the ring nuts on either end, the Sleeve is so compressed upon the shaft as to prevent the slightest movement in the connection.

Diam.	1 1/4	1 1/2	1 3/4	1 7/8	1 15/16
Price,	\$2.20	2.60	3.10	3.85	4.85
Diam.	2 1/8	2 1/4	2 3/8	2 1/2	3 1/8
Price,	\$6.10	7.40	11.10	16.25	22.30

Intermediate and larger sizes furnished when required. Prices upon application.

DENTAL CLUTCH COUPLINGS.

These Couplings are used where it is desirable to disconnect one part of a line-shaft and permit the balance to run. They can be engaged or disengaged while the shaft revolves at a moderate speed.

They are a cheap substitute for the Friction Clutch (see page 362), and for shafts that revolve at moderate speed, can be used to good advantage.



FIG. 1269. SQUARE JAW

FIG. 1270.
SPIRAL JAW.
Left-Hand.FIG. 1271.
SPIRAL JAW
Right-Hand.

Size Shaft.	Not Fitted.	Fitted on Shaft.	Price on Lever.
1 1/4	\$4.40	\$7.15	\$2.50
1 1/2	4.80	7.70	3.00
1 3/4	5.35	8.45	3.50
2 1/4	6.35	8.70	4.00
2 1/2	7.45	11.00	4.50
2 3/4	8.85	12.10	5.00
3 1/4	12.00	16.50	6.25

Larger sizes furnished when desired.



FIG. 1272. UNIVERSAL COUPLING.

These Couplings are of suitable strength to transmit full power of shafts for which they are designed, and will operate at an angle of 25 degrees. Prices will be named on application.

STOCK STRAIGHTENER.

This Tool will be found valuable for straightening finished work as it does not injure or deface Finished shafts, spindles, drills, taps, reamers, etc., which have become crooked by hardening, key-seating or accident.

No. 1, \$15.00, will straighten round or square stock up to 1 1/4 inches diameter.

If the stock is heated red hot the capacity of the machine is doubled.

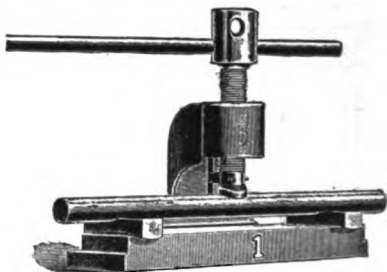


FIG. 1273.

NO. 1 STOCK STRAIGHTENER.

No. 2, \$30.00, will straighten 2 1/4 inch stock cold, or 5 inch red hot. We can furnish the No. 2 Machine with legs, at an additional cost of \$5.00.

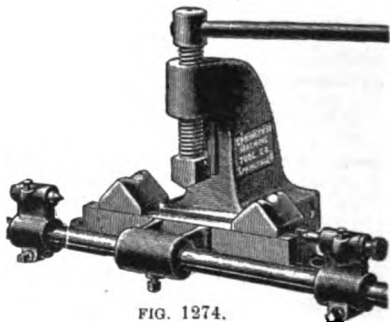


FIG. 1274.

STRAIGHTENER AND CENTERS.

This Machine is useful for centering work by hand, and for straightening work centered by hand or machine. Price, \$40.00.



FIG. 1275.—SOLID.

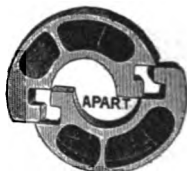


FIG. 1276.—SPLIT.

SHARTLE'S SAFETY SET COLLARS.

The heads of screws are below the surface, and cannot catch clothes, belts, etc. No bolts are used. They are light and strong. Can furnish any size up to 8

inches. A common monkey wrench is used to tighten the set screw.

The Split Collars can be put on instantly, without taking off the pulleys or couplings. For prices of Split Collars, add 50 per cent to the following list:

Size,	1 $\frac{1}{2}$	1	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Price,	\$0.30	.33	.35	.37	.38	.40	.45
Size,	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$
Price,	\$0.48	.50	.64	.72	.96	1.20	1.44

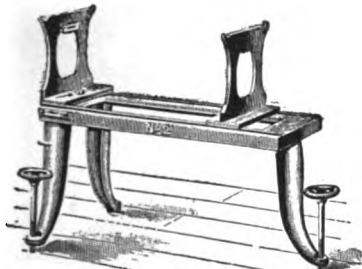


FIG. 1277. ROWSHER BALANCING WAY.

This Way is used in balancing all kinds of work, such as pulleys, cutter-heads, armatures, etc., and is designed to supersede the "Horse" and similar devices commonly used in machine shops.

The frame is supported by three legs or feet, consequently always stands firmly; two of these feet are adjustable by means of the screws shown. A Spirit Level is secured to the fixed standard, and also one on the bed, so that both lateral and cross levels can be accurately determined.

No. 1, \$18.00, intended to be set on a bench, and for light work. Length of bed, 24 inches; height of standards, 9 $\frac{1}{2}$ inches.

No. 2 (see Fig. 1277), \$28.00; intended for general shop use. Length of bed, 32 inches; height of standards, 12 $\frac{1}{2}$ inches.

No. 3, \$40.00, intended for large work, although the standards will come sufficiently close together for the smallest work. Length of bed, 42 inches; height of standards, 24 $\frac{1}{2}$ inches.

TORN CATALOGUES—Every article in this catalogue is very plainly described, either by figure number, regular number, or name; and we beg of our customers not to cut nor tear out parts of these, as this mutilates the book, and when done to any extent destroys it for reference.

WOOD PULLEYS.

Three or four years ago, in the course of a conversation with an "old school" manufacturer, he made the assertion that Wood Pulleys were a "fad" and would "Have their day."

From the present outlook, their "day" is destined to be long, and they are now being turned out by two or three large factories and a score of small ones, at the rate of about two thousand per day, with a constantly increasing demand.

THE DODGE "INDEPENDENCE" WOOD SPLIT PULLEYS.

These Pulleys are too well and favorably known to require comment from us.

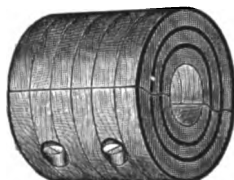


FIG. 1278d.

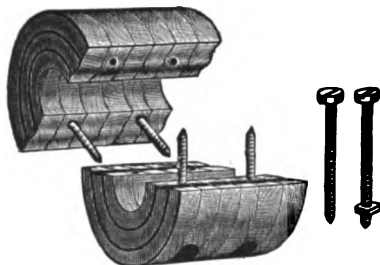


FIG. 1278d. Style of 3 to 8 inch.



FIG. 1279d. Style of 9 to 36 inches.



FIG. 1279d.

This style on all sizes larger than 38 inches in diameter.

SPECIAL PULLEYS.

The following cuts represent what are known as Special Pulleys, although some styles and sizes are kept in stock at the factory for prompt delivery. Further information and prices will be given upon application.

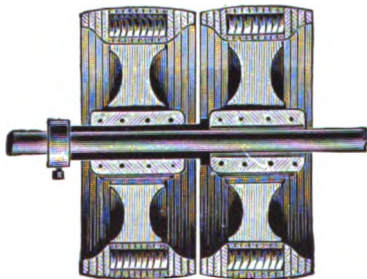


FIG. 1280d.

TIGHT & LOOSE WOOD PULLEYS.

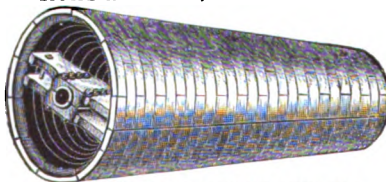


FIG. 1281d. TAPER CONE PULLEYS.



FIG. 1282d.

SPECIAL DYNAMO PULLEY.

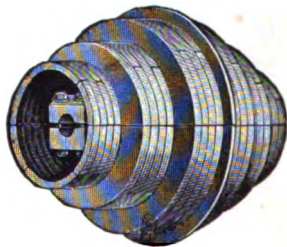


FIG. 1283d.

For prices of Cone Pulleys add 50 per cent to list prices for the same number of separate pulleys of the same diameter and width of face as the several steps of the cone.

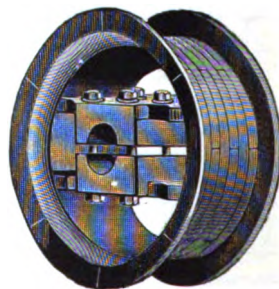


FIG. 1284d.

Prices for Flange Pulleys—add 15 per cent for one flange, 20 per cent for two flanges, and 25 per cent for three flanges.

PRICE LIST OF DODGE "INDEPENDENCE" WOOD SPLIT PULLEYS.

WIDTH OF FACE.

Diam.	3	4	5	6	7	8	10	12	14	16	18	20	24
3	\$0.88	\$0.88	\$0.92	\$0.99	\$1.05	\$1.12	\$1.25	\$1.40	\$1.58	\$1.75			
4	.88	.92	.96	1.05	1.12	1.18	1.31	1.47	1.65	1.82			
5	.92	.96	1.08	1.12	1.16	1.25	1.39	1.53	1.71	1.88			
6	.96	1.01	1.10	1.18	1.25	1.31	1.45	1.60	1.78	1.95			
7	1.01	1.05	1.17	1.25	1.31	1.39	1.52	1.66	1.84	2.02			
8	1.05	1.10	1.22	1.32	1.39	1.45	1.58	1.75	1.98	2.10			
9	1.10	1.16	1.27	1.39	1.44	1.49	1.65	1.82	2.00	2.19			
10	1.14	1.21	1.21	1.43	1.49	1.56	1.71	1.92	2.19	2.52			
11	1.18	1.25	1.36	1.47	1.55	1.63	1.80	2.06	2.41	2.79			
12	1.23	1.30	1.40	1.56	1.62	1.69	1.88	2.23	2.63	2.99			
13	1.27	1.36	1.49	1.65	1.75	1.86	2.10	2.45	2.76	3.15			
14	1.32	1.43	1.60	1.80	1.93	2.06	2.35	2.63	2.99	3.37			
15	1.36	1.52	1.69	1.91	2.09	2.23	2.56	2.85	3.15	3.66			
16	1.45	1.60	1.78	2.02	2.22	2.41	2.76	3.06	3.37	3.96			
18	1.62	1.78	2.00	2.23	2.48	2.78	3.00	3.50	3.94	4.68	\$5.69		
20	1.95	1.95	2.28	2.62	2.89	3.04	3.50	3.73	4.82	5.52	6.43		
22	2.17	2.17	2.58	3.00	3.26	3.50	4.12	4.90	5.69	6.20	7.44		
24	2.36	2.36	2.79	3.20	3.53	3.85	4.58	5.56	6.51	7.68	8.75	\$10.50	
26	2.78	2.78	3.06	3.54	3.85	4.20	4.76	6.22	6.66	9.10	10.55	13.73	\$17.50
28	3.15	3.15	3.40	3.76	4.14	4.51	5.30	6.68	6.80	10.06	11.77	14.44	18.16
30	3.50	3.50	3.76	4.10	4.58	5.03	5.80	7.22	9.19	11.10	13.13	15.10	18.49
32		3.85	4.12	4.51	5.08	5.65	6.56	7.83	9.96	12.15	14.12	15.86	19.35
34		4.20	4.65	5.08	5.69	6.35	7.44	8.75	10.72	13.13	15.10	16.96	20.46
36		4.64	5.21	5.69	6.35	7.00	8.36	9.85	11.60	14.22	16.19	18.16	21.66
38		5.09	5.92	6.13	7.08	7.70	9.15	10.84	12.47	15.10	17.18	19.16	23.63
40		6.12	6.35	7.00	7.66	8.31	9.85	11.71	13.56	15.86	18.16	21.00	25.37
42		6.78	7.08	7.66	8.53	9.41	10.94	12.69	14.66	16.85	18.93	22.31	27.56
48		9.19	9.62	10.72	11.49	12.25	14.22	15.75	17.94	19.69	21.88	27.13	35.00
54			14.66		16.41	17.95	19.69	21.66	24.28	28.23	32.16	40.47	
60			18.60		20.56	22.53	24.50	27.13	29.97	34.13	39.80	48.56	
66					32.43	34.94	37.78	41.28	45.00	50.84	56.06	66.88	
72					34.94	38.00	41.28	45.00	49.37	55.25	60.80	73.44	
78					38.00	41.56	45.50	49.85	54.25	60.80	67.37	84.44	
84					41.56	44.63	48.13	51.86	55.44	60.80	67.37	84.44	
90					48.13	51.19	54.69	58.63	63.00	67.37	76.13	94.94	
96					54.25	57.31	61.25	65.63	70.00	74.37	84.00	103.69	

IN ORDERING PULLEYS—*First*, state diameter of pulley; *Second*, width of face; *Third*, exact size of shaft; *Fourth*, whether Crown or Flat Face.

Unless otherwise specified all orders will be filled with Crown face.

We carry in stock other sizes and can furnish any size desired.

FRICITION CUT-OFF COUPLINGS AND FRICITION CLUTCH PULLEYS.

It is only within the past few years that Friction Clutch Pulleys and Couplings have been regarded as essential features of a complete shafting equipment. They are fast superseding the Tight and Loose pulleys, and their use suggests advantages which can be secured through no other means. It is unnecessary for us to go into details as to what kind of machinery they are especially advantageous for, as all manufacturing establishments can employ them to good advantage.

There is hardly a machine tool in our own shops that is not equipped with a Friction countershaft, and the main line shaft, as well as all other lines of shafting, are also provided, so that we can disconnect any, or all lines instantly, either for repairs or in case of an accident.

Serious accidents are often prevented, and danger to life and machinery averted by the quick control which friction clutches afford over the power.

There are a great many makers of Clutch Pulleys and Couplings, and as far as we have observed, every maker claims that his particular style of Pulley or Coupling is the best.

We show on these pages three styles adapted to varying needs; they are perhaps not the best, but are all good, and we don't happen to know of any others that we think are better. We print a limited line of sizes, but can furnish any size required.

On account of our limited space, we have omitted detailed particulars, such as amount of space taken on shaft, sizes of shaft to which the different sized pulleys are adapted, and H. P. transmitted.

In writing state requirements, and we will give as complete information as we can. Remember also that, on account of the great variety, it is impossible to carry anything like a complete stock of finished Clutch Pulleys or Couplings, so that it will be well, if possible, to give ample time for furnishing these.

Prices include Pulley and Clutch complete with shifter fork, but not lever.

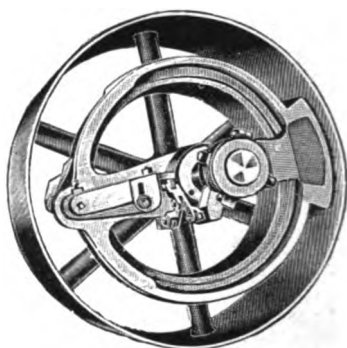


FIG. 1286.

OESTERLEIN CLUTCH PULLEY.

The Oesterlein, Fig. 1286, is a very simple and effective Clutch. It has a large friction surface, clutching the pulley with equal pressure all around. These are sold largely in the small and medium sizes. Can furnish from 6 to 60 inch.

PRICE LIST.

Diam.	Face.	Price.	Diam.	Face.	Price.
10	3	\$9.75	24	6	\$22.80
10	4	11.25	24	8	26.40
10	5	12.00	24	10	26.40
10	6	14.25	28	5	28.20
12	3	12.00	28	6	28.80
12	4	12.75	28	8	31.20
12	5	13.50	28	10	35.40
12	6	14.25	28	12	37.20
12	8	15.75	30	5	28.80
14	4	12.75	30	6	30.60
14	5	13.50	30	8	34.80
14	6	14.25	30	10	37.20
14	8	16.50	30	12	42.60
16	4	16.80	32	5	30.00
16	5	18.00	32	6	32.40
16	6	20.40	32	8	37.20
16	8	21.60	32	10	42.00
16	10	24.00	32	12	44.40
20	4	18.00	32	16	54.00
20	5	21.75	36	6	39.60
20	6	22.50	36	8	43.20
20	8	24.00	36	10	45.60
20	10	27.00	36	12	51.60
24	4	19.80	36	14	55.29
24	5	21.60	36	16	62.40

OESTERLEIN'S CLUTCH COUPLINGS.

Diam.	Price.	H. P. at 100 Rev. on Shaft.	Space on Shaft.	Average Bore.
10	\$14.65	5	14½	1½
12	20.00	8	17	1½
14	28.00	13	17½	2½
16	36.00	18	19½	2½
18	40.00	21	19½	2½
20	45.35	25	21½	2½
24	54.65	46	24½	2½
30	91.65	78	29½	3½

Diam.	Face.	Price.	Diam.	Face.	Price.
36	5	\$45.85	42	14	\$89.80
36	6	48.15	42	16	99.00
36	8	53.10	42	18	109.00
36	10	58.50	48	6	77.00
36	12	64.50	48	8	84.90
36	14	71.10	48	10	93.57
36	16	78.35	48	12	103.03
42	5	60.85	48	14	113.73
42	8	66.95	48	16	125.40
42	10	83.95	48	18	138.25
42	12	81.50	48	20	152.40

IMPERIAL CLUTCH COUPLINGS.

Diameter.	Price.	H. P. at 100 Rev.	Space on Shaft.
32	\$86.57	32	23½
40	173.25	107	29½
48	240.00	147	31½
56	306.65	252	35½

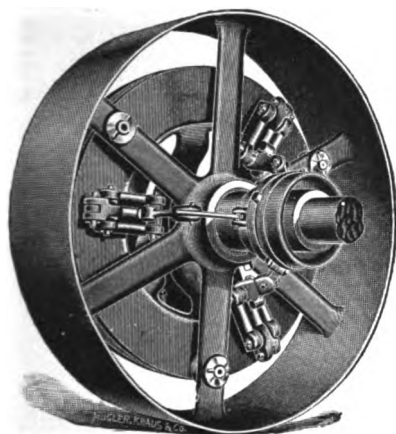


FIG. 1287.

IMPERIAL CLUTCH PULLEY.

We sell this Pulley for medium and heavy work. We think it has no superior as regards efficiency, durability, ease of adjustment, and general good qualities. Can furnish in sizes from 16 to 72 inch. Descriptive circulars sent upon application.

PRICE LIST.

Diam.	Face.	Price.	Diam.	Face.	Price.
20	4	\$23.05	28	5	\$33.10
20	5	23.80	28	6	34.75
20	6	24.75	28	8	38.30
20	8	26.75	28	10	42.25
20	10	28.95	28	12	46.50
24	4	26.95	30	5	35.90
24	5	28.10	30	6	37.70
24	6	29.30	30	8	41.65
24	8	31.75	30	10	45.85
24	10	34.30	30	12	50.50
24	12	37.35	30	14	55.65

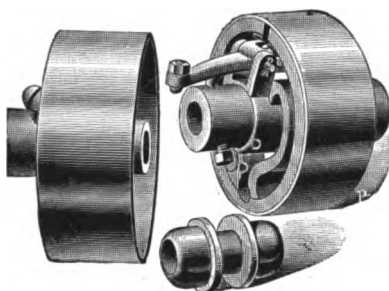


FIG. 1288.

GARVIN FRICTION CLUTCH PULLEY.

This Pulley is especially adapted for use on machine tool countershafts, running at medium and high speed, which require frequent reversal, without jar or undue wear to the frictions. They will stand severe usage, and may be run successfully at 700 revolutions. Are made in a limited number of sizes.

PRICE LIST.

Diam.	Face.	Hole.	Each.	Per Pair.
6	1½	1⅞	\$4.50	\$7.50
8	2½	1⅞	4.50	8.00
8	3	1⅞	5.50	10.00
10	3	1⅞	6.50	12.00
12	3½	1⅞	7.50	14.00
14	4	1⅞	8.50	16.00
16	4	1⅞	10.00	18.00

IRON PULLEYS.

While Wooden Pulleys have in a very large measure taken the place of Iron Pulleys, there are many places in which Iron Pulleys can be used to greater advantage, and other places in which Wood Pulleys cannot be used at all.

The manufacturers of Wood Pulleys enjoy a decided advantage over the Iron Pulley men, by reason of the system of interchangeable bushings. With the use of the bushing system, a stock of 100 Pulleys with, say an extra 100 Bushings, is fully equal to a stock of 500 Iron Pulleys. This advantage has resulted in

there being large stocks of Wood Pulleys carried, all over the country, while, to the best of our knowledge, there is no one carrying what might be called a complete stock of Iron Pulleys.

We do not carry Iron Pulleys in stock, and it takes from two to four days to fill orders shipped from factory direct, and from four to ten days to fill orders shipped from store.

Our Iron Pulleys are finished and balanced, and are superior goods in every way.

In ordering Pulleys always state style of face—whether Flat or Crown.

PRICE LIST OF FINISHED AND BALANCED PLAIN IRON PULLEYS.

FIG. 1293.

For prices of Split Pulleys, Clamp Hub-Pulleys, Tight and Loose Pulleys, and Flange Pulleys, see page 366.

WIDTH OF FACE.

Diam.	3	4	5	6	7	8	10	12	14	16
6 in.	\$1.11	\$1.20	\$1.26	\$1.38	\$1.53	\$1.70	\$1.89	\$2.07		
7 "	1.20	1.35	1.49	1.62	1.77	1.91	2.07	2.34		
8 "	1.33	1.43	1.58	1.72	1.92	2.07	2.25	2.66		
9 "	1.44	1.58	1.74	1.91	2.07	2.24	2.52	2.97		
10 "	1.53	1.67	1.85	2.02	2.18	2.34	2.65	3.15		
11 "	1.62	1.75	1.94	2.12	2.27	2.45	2.79	3.28		
12 "	1.76	1.89	2.07	2.25	2.43	2.61	3.02	3.47	\$3.83	
13 "	1.85	2.03	2.16	2.39	2.52	2.70	3.15	3.74	4.40	
14 "	1.94	2.12	2.25	2.48	2.66	2.84	3.35	4.00	4.50	
15 "	2.03	2.20	2.34	2.57	2.80	3.02	3.42	4.27	4.65	
16 "	2.16	2.30	2.43	2.66	2.93	3.20	3.55	4.32	4.48	
17 "	2.34	2.43	2.61	2.84	3.15	3.38	3.70	4.40	4.93	\$5.44
18 "	2.52	2.61	2.79	3.02		3.51	3.88	4.60	5.16	5.76
19 "	2.70	2.79	2.97	3.20		3.78	4.12	4.92	5.60	6.12
20 "	2.88	2.97	3.15	3.38		4.05	4.40	5.16	5.92	6.52
22 "	3.24	3.38	3.51	3.78		4.59	5.04	6.00	6.64	7.36
24 "	3.60	3.78	4.05	4.50		5.40	5.84	6.88	7.60	8.48
26 "	3.83	4.05	4.41	4.95		5.94	6.40	7.60	8.48	9.40
28 "	4.14	4.32	4.77	5.40		6.48	6.88	8.16	9.40	10.60
30 "	4.41	4.59	5.18	5.85		7.20	7.52	8.96	10.40	11.60
32 "	4.73	4.95	5.63	6.43		8.19	8.40	9.92	11.48	12.80
34 "	5.18	5.40	6.12	6.93		8.64	9.28	10.72	12.32	13.92
36 "	5.67	5.94	6.75	7.56		9.36	9.84	11.28	13.04	14.64
38 "		6.66	7.47	8.46		10.35	10.88	12.40	14.20	15.84
40 "		7.20	8.10	9.27		11.03	11.60	13.52	15.00	17.04
42 "		8.00	8.73	9.81		11.61	12.12	14.08	15.84	17.92
44 "		8.91	9.36	10.44		12.51	13.20	15.20	17.20	19.20
46 "		10.00	10.40	11.16		13.28	14.20	16.60	18.92	21.12
48 "		10.89		11.88		14.04	14.92	17.56	20.24	22.72
50 "		11.34		12.92		15.00	15.88	18.52	21.44	24.24

FINISHED AND BALANCED PLAIN IRON PULLEYS—FOR DOUBLE BELTS.

Diam.	WIDTH OF FACE.								
	4	5	6	8	10	12	14	16	20
16 in.	\$2.72	\$2.96	\$3.20	\$3.60	\$4.20	\$5.04	\$5.84		
18 "	3.04	3.24	3.52	4.08	4.84	5.76	6.44	\$7.20	
20 "	3.12	3.32	3.64	4.20	5.52	6.44	7.40	8.16	
22 "	3.84	4.08	4.32	5.32	6.32	7.52	8.32	9.20	\$10.12
24 "	4.36	4.68	5.20	6.24	7.32	8.60	9.52	10.60	11.80
26 "	4.68	5.04	5.72	6.88	8.00	9.52	10.60	11.76	13.00
28 "	5.00	5.48	6.20	7.48	8.64	10.24	11.76	13.24	14.72
30 "	5.20	5.84	6.60	8.24	9.40	11.20	13.00	14.48	16.00
32 "	5.52	6.28	7.16	9.12	10.48	12.40	14.36	16.00	17.76
34 "	6.00	6.80	7.68	9.60	11.60	13.40	15.40	17.40	19.44
36 "	6.60	7.52	8.40	10.40	12.32	14.12	16.32	18.32	20.32
38 "	7.40	8.24	9.40	11.52	13.60	15.52	17.76	19.80	21.84
40 "	8.00	9.00	10.32	12.24	14.48	17.28	18.76	21.28	23.80
42 "	8.88	9.72	10.88	12.88	15.16	17.60	19.80	22.40	25.00
44 "	9.92	10.40	11.60	13.92	16.48	19.00	21.52	24.00	26.60
46 "	11.12	11.56	12.40	14.72	17.76	20.76	23.64	26.40	29.36
48 "	12.12		13.20	15.60	18.64	21.96	25.32	28.40	31.48
50 "	13.16		14.36	16.64	19.84	23.16	26.80	30.32	33.84
52 "	14.80		16.00	18.32	22.60	24.80	28.40	32.00	36.00
54 "	16.48		17.92	19.68	23.20	26.00	29.92	34.12	38.40
56 "	17.76		19.24	21.40	24.96	28.00	32.00	36.40	40.80
58 "	18.48		20.45	22.60	25.80	29.20	35.52	40.40	44.96
60 "	19.20		20.84	23.68	27.12	30.08	36.24	41.12	45.60
62 "	20.40		22.24	24.80	28.32	32.00	36.56	41.60	47.20
64 "	21.60		23.52	26.16	29.12	32.80	37.60	42.40	48.00
66 "			24.40	27.04	30.40	33.96	38.80	43.80	49.60
68 "			26.00	28.64	32.00	34.00	40.16	45.40	51.20
70 "			27.20	30.00	33.80	37.20	42.00	48.00	54.00
72 "			28.40	31.28	34.40	39.60	44.80	50.40	57.20

FINISHED AND BALANCED IRON PULLEYS—DOUBLE ARMS, FIG. 1297.

Diam.	WIDTH OF FACE.									
	20	24	26	28	30	32	36	40	42	46
22 in.	\$12.72	\$15.52	\$17.04	\$19.64	\$20.32					
24 "	15.08	18.24	20.00	21.88	23.88					
26 "	16.48	19.68	21.52	23.52	25.68					
28 "	18.64	22.04	23.92	25.96	28.24					
30 "	20.24	24.08	26.24	28.56	31.04					
32 "	22.52	26.68	28.96	31.36	33.92					
34 "	24.60	29.20	31.68	34.24	36.88					
36 "	25.88	31.00	33.72	36.60	39.44					
38 "	27.64	32.76	35.44	38.20	41.08	\$41.04	\$47.08	\$56.72		
40 "	30.32	36.28	39.36	42.48	45.68	49.00	56.00	63.20		
42 "	31.84	38.08	41.36	44.72	48.20	51.76	59.12	66.80		
44 "	33.68	39.96	43.28	46.72	50.28	53.96	61.68	69.80		
46 "	37.04	43.88	47.44	51.12	54.92	58.80	66.88	75.48		
48 "	38.88	46.00	49.68	53.44	57.28	61.20	69.36	77.76		
50 "	42.56	49.16	54.08	58.08	62.16	66.32	74.88	83.76		
52 "	45.84	53.92	58.08	62.32	66.64	71.04	80.08	89.44		
54 "	48.80	57.36	61.76	66.24	70.80	75.44	84.96	94.80	\$99.84	\$104.96
56 "	51.76	60.80	65.44	70.16	74.96	79.84	89.84	100.16	105.44	110.80
58 "	56.56	66.08	68.80	78.76	78.80	83.92	94.40	105.90	110.72	116.32
60 "	57.40	67.28	72.32	77.44	82.64	87.92	98.72	109.84	115.52	121.28
64 "	60.08	71.04	75.64	82.32	88.08	93.92	105.84	118.08	124.32	130.64
68 "	63.60	75.52	81.60	87.76	94.00	100.32	113.12	126.40	133.12	139.92
72 "	71.00	84.16	90.80	97.52	104.32	111.20	125.20	139.52	146.80	154.16

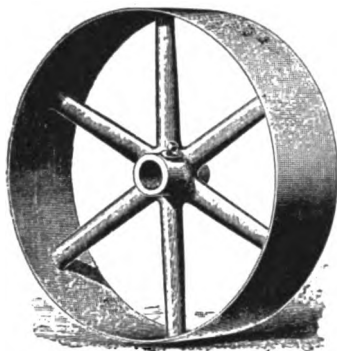


FIG. 1293. PLAIN PULLEY.
For prices see pages 364 and 365.

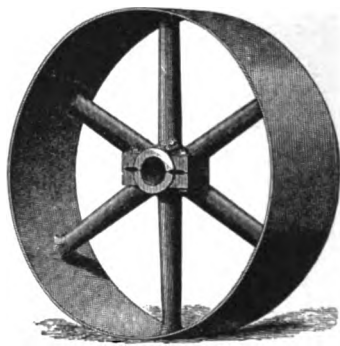


FIG. 1296. CLAMP HUB PULLEY.
To obtain prices of Clamp Hub Pulleys, add to price lists on pages 364 and 365:
On sizes 6 to 19 inches diam., 25 per cent
" 13 to 24 " " 20 "
" 25 to 36 " " 12½ "
" 37 to 48 " " 10 "
" 50 and larger " 5 "

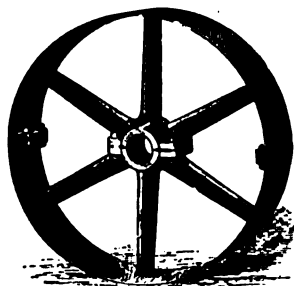


FIG. 1294. SPLIT PULLEY.
To obtain price of Split Pulleys, add to the price lists on pages 364 and 365:
On sizes 6 to 12 inches diam., 40 per cent
" 12 to 20 " " 30 "
" 25 to 36 " " 20 "
" 37 to 48 " " 15 "
" 50 and larger " 10 "

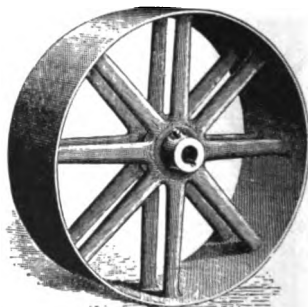


FIG. 1297. DOUBLE ARM PULLEY.
All Pulleys with faces 20 inches wide and over are made with two sets of arms, as shown in above cut. Prices on page 365.

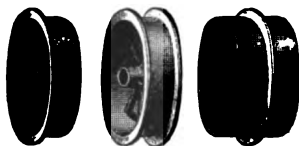


FIG. 1295. FLANGE PULLEYS.
To obtain price of Flange Pulleys, add to the price lists on pages 364 and 365
Center Flange, all sizes, 35 per cent.
Flange on one edge, 60 "
Flanges on both edges, 100 "

TIGHT AND LOOSE PULLEYS.

To obtain price of Tight and Loose Pulleys, add to price lists on pages 364 and 365:
On sizes 6 to 24 inches diam., 15 per cent
On sizes larger than 24 in. " 5 "

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FIG. 1298. GROOVED PULLEY.

For manilla or hemp rope. We are prepared to furnish these from 3 ft. to 30 ft. pitch diameter, with any number of grooves required.

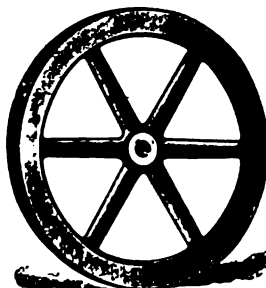


FIG. 1299. BALANCE WHEEL.

We can furnish Balance or Fly Wheels of symmetrical proportion, of any diam. up to and including 30ft. either rough or finished. Prices given upon application.

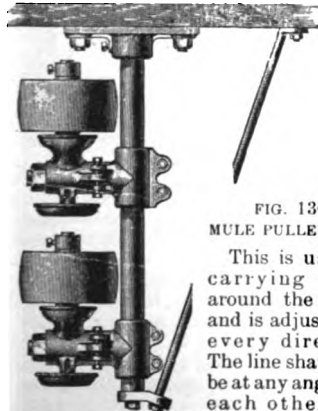


FIG. 1300.

MULE PULLEY STAND

This is used for carrying power around the corner, and is adjustable in every direction. The line shafts may be at any angle with each other, may

not be in the same plane, the pulleys may differ much in diameter, and the belt may be crossed.

Locate the stand so that the shaft may be ten times the width of the belt from the line shafts.

		Single Belt.	Double Belt.
No. 1, for belts 3 to 5 in.,		\$24.00	\$30.40
" 2, "	6 to 8 "	30.40	40.00
" 3, "	9 to 12 "	40.00	64.00
" 4, "	13 to 15 "	64.00	104.00
" 5, "	16 to 19 "	104.00	144.00

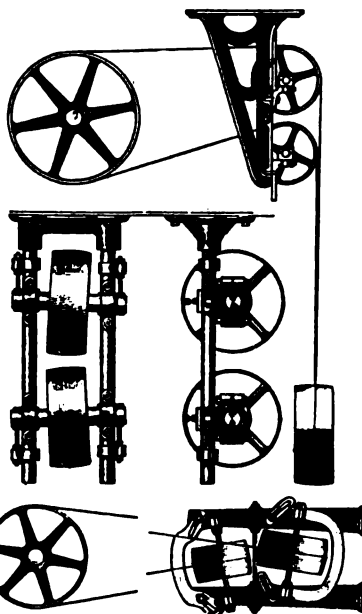


FIG. 1301. BINDER FRAMES.

The illustration shows the line shaft at right angles, but the Machine will operate with the shafting at any angle. The cut shows style of Nos. 1 and 2; the larger sizes from No. 3 upwards are Double Braced and much heavier.

		Single Belt.	Double Belt.
No. 1, for belts 2 to 3 in.,		\$12.80	
" 2, "	4 to 5 "	24.00	
" 3, "	6 to 8 "	71.60	\$76.80
" 4, "	9 to 11 "	76.80	85.60
" 5, "	12 to 15 "	85.60	119.20
" 6, "	16 to 19 "	119.20	172.00

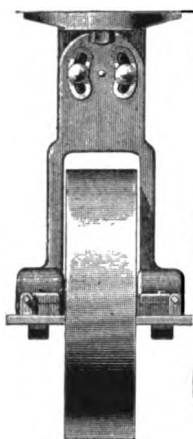


FIG. 1302.
GUIDE PULLEY.

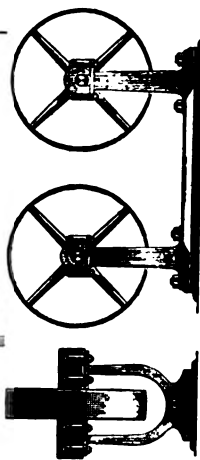
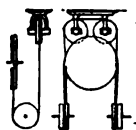


FIG. 1303.
DOUBLE GUIDE.



The Guide Pulley, Fig. 1302, for 3 inch belt, \$5.40; 4 inch belt, \$7.65; 8 inch belt, \$13.50.
Double Guide, Fig. 1303, price, \$25.00.

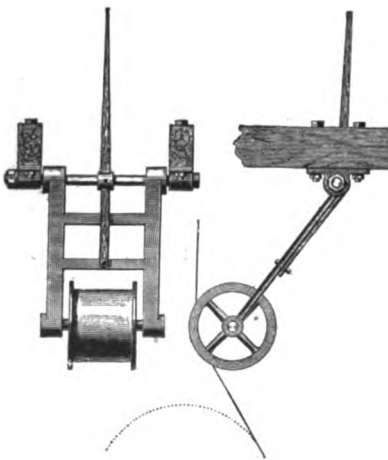


FIG. 1304. BELT TIGHTENER.

For 8 inch Belt, \$24.00
" 12 " " 44.00

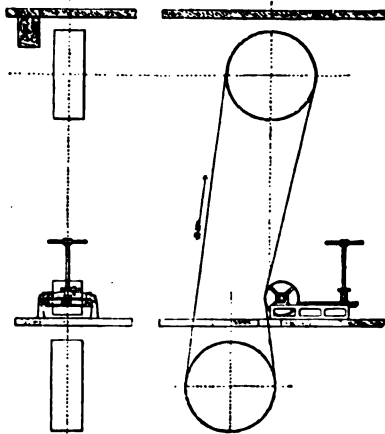


FIG. 1305. BELT TIGHTENER.
For Belts 6 to 8 inches, \$48.00
" " 9 to 14 " 60.00

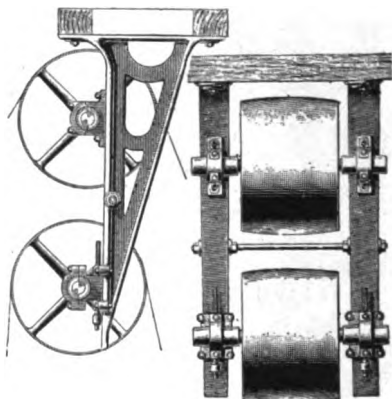


FIG. 1306. BELT TIGHTENER.
For 16 inch Belt, \$80.00.

We can furnish other styles in large Belt Tighteners, suitable for Belts up to 42 inches in width.

We can furnish to order any style of Belt Tighteners suitable for belts up to 42 inches in width, and running in any position or angle.

We shall be pleased to furnish any information desired in regard to the use of Belt tighteners.

SPUR GEARS.

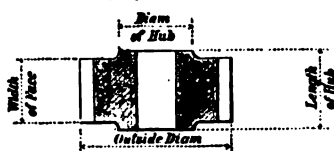


FIG. 1307.

SECTIONAL VIEW SHOWING PLAIN GEAR.



FIG. 1308.

SECTIONAL VIEW SHOWING WEB GEAR.

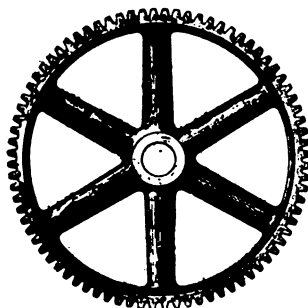


FIG. 1309.

SHOWING ARM GEAR.

On the following pages we describe and price a large variety of Gears, the greater proportion of which are kept in stock for prompt delivery. While we have put in what we consider a very complete assortment, there are perhaps as many more regular Stock Sizes, which we have left out for lack of room.

Our facilities for furnishing large quantities of Special Gears are exceptionally good, as our Gear Cutting plant is complete and well equipped. It is not generally known that when large numbers of Cut Gears are wanted, they can be furnished at prices that will compare favorably with those of ordinary gearing with cast teeth, when the expense of cleaning, filing and grinding is considered.

We respectfully solicit correspondence in matters relating to Gearing, any and all kinds.

4-PITCH CHANGE GEARS.

Width of Face, $1\frac{1}{4}$ inches.
 Size of Hole, $1\frac{1}{8}$ "
 Diameter of Hub, $2\frac{1}{4}$ "
 Length of Hub, $1\frac{1}{8}$ "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
12	\$1.58	3	$3\frac{1}{4}$	Plain
16	1.87	4	$4\frac{1}{4}$	"
20	2.13	5	$5\frac{1}{4}$	"
24	2.34	6	$6\frac{1}{4}$	Web
28	2.63	7	$7\frac{1}{4}$	"
32	2.94	8	$8\frac{1}{4}$	"
36	3.22	9	$9\frac{1}{4}$	"
40	3.48	10	$10\frac{1}{4}$	Arms
44	3.75	11	$11\frac{1}{4}$	"
48	4.05	12	$12\frac{1}{4}$	"
52	4.35	13	$13\frac{1}{4}$	"
56	4.65	14	$14\frac{1}{4}$	"
60	4.95	15	$15\frac{1}{4}$	"
64	5.23	16	$16\frac{1}{4}$	"

6-PITCH CHANGE GEARS.

Width of Face, $1\frac{1}{4}$ inches.
 Size of Hole, $1\frac{1}{8}$ "
 Diameter of Hub, 2 "
 Length of Hub, $1\frac{1}{8}$ "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
16	\$1.34	$2\frac{1}{2}$	3	Plain
20	1.43	$3\frac{1}{2}$	$3\frac{1}{2}$	"
24	1.65	4	$4\frac{1}{2}$	"
28	1.78	$4\frac{1}{2}$	5	Web
32	1.93	$5\frac{1}{2}$	$5\frac{1}{2}$	"
36	2.10	6	$6\frac{1}{2}$	"
40	2.27	$6\frac{1}{2}$	7	"
44	2.42	$7\frac{1}{2}$	$7\frac{1}{2}$	"
48	2.57	8	$8\frac{1}{2}$	Arms
52	2.73	$8\frac{1}{2}$	9	"
56	2.88	$9\frac{1}{2}$	$9\frac{1}{2}$	"
60	3.05	10	$10\frac{1}{2}$	"
64	3.20	$10\frac{1}{2}$	11	"
68	3.36	$11\frac{1}{2}$	$11\frac{1}{2}$	"
72	3.53	12	$12\frac{1}{2}$	"
76	3.70	$12\frac{1}{2}$	13	"

8-PITCH CHANGE GEARS.

Width of Face, 1 inch.
 Size of Hole, 1 "
 Diam. of Hub, $1\frac{1}{4}$ "
 Length of Hub, $1\frac{1}{8}$ "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
20	\$1.28	$2\frac{1}{2}$	$2\frac{1}{2}$	Plain
24	1.33	3	$3\frac{1}{2}$	"
28	1.43	$3\frac{1}{2}$	$3\frac{1}{2}$	"
32	1.54	4	$4\frac{1}{2}$	"
34	1.55	$4\frac{1}{2}$	$4\frac{1}{2}$	Web

8-PITCH CHANGE GEARS—Continued.

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
36	\$1.60	4½	4½	Web
38	1.65	4½	5	"
40	1.70	5	5½	"
42	1.75	5½	5½	"
44	1.80	5½	5½	"
46	1.88	5½	6	"
48	1.92	6	6½	"
50	1.96	6½	6½	"
52	2.00	6½	6½	"
56	2.10	7	7½	Arms
60	2.20	7½	7½	"
64	2.30	8	8½	"
68	2.41	8½	8½	"
72	2.50	9	9½	"
76	2.60	9½	9½	"
80	2.72	10	10½	"
84	2.82	10½	10½	"
88	2.93	11	11½	"

10-PITCH CHANGE GEARS.

Width of Face, ½ inch.
 Size of Hole, ½ "
 Diameter of Hub, 1½ "
 Length of Hub, 1 "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
20	\$1.10	2	2½	Plain
24	1.14	2½	2½	"
28	1.21	2½	3	"
32	1.27	3½	3½	"
36	1.33	3½	3½	"
40	1.40	4	4½	"
44	1.49	4½	4½	Web
48	1.50	4½	5	"
52	1.64	5½	5½	"
56	1.71	5½	5½	"
60	1.79	6	6½	Arms
64	1.86	6½	6½	"
68	1.93	6½	7	"
72	2.00	7½	7½	"
80	2.13	8	8½	"
84	2.21	8½	8½	"
88	2.28	8½	9	"
96	2.43	9½	9½	"
100	2.50	10	10½	"

12-PITCH CHANGE GEARS.

Width of Face, ½ inch.
 Size of Hole, ½ "
 Diameter of Hub, 1½ "
 Length of Hub, 1½ "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
20	\$1.06	2½	2½	Plain
30	1.12	2½	2½	"
34	1.16	2½	3	"
38	1.23	3½	3½	"
42	1.29	3½	3½	"
46	1.34	3½	4	Web
50	1.40	4½	4½	"
54	1.45	4½	4½	"
58	1.50	4½	5	"
62	1.56	5½	5½	"
66	1.63	5½	5½	"
70	1.68	5½	6	Arms
74	1.73	6½	6½	"
78	1.79	6½	6½	"
82	1.85	6½	7	"
86	1.90	7½	7½	"
90	1.96	7½	7½	"
94	2.00	7½	8	"
98	2.10	8½	8½	"
102	2.15	8½	8½	"
106	2.27	8½	9	"

13-PITCH CHANGE GEARS.

Width of Face, ½ inch.
 Size of Hole, 1 "
 Diameter of Hub, 1½ "
 Length of Hub, 1½ "

No. of Teeth.	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
24	\$1.04	2	2½	Plain
28	1.09	2½	2½	"
30	1.12	2½	2½	"
34	1.16	2½	3	Web
36	1.19	3	3½	"
38	1.23	3½	3½	"
40	1.26	3½	3½	"
42	1.28	3½	3½	"
44	1.31	3½	3½	"
46	1.34	3½	4	"
48	1.38	4	4½	"

follows: 10-pitch, 15 cts.; 8-pitch, 20 cts.;
 7-pitch, 25 cts.; 6-pitch, 30 cts.

Pitch.	Per Foot.	Width, in.	Thick, in.	Length up to in.	Steel
10	\$1.10	1	½	41	"
8	1.35	1½	½	38	"
7	1.50	1½	1½	41	Cast Iron
6	2.00	1½	1½	37	"

We carry in stock Racks with cut teeth, made of steel and cast iron, as per table.

On orders for Rack less than one ft. in length, we charge extra for cutting, as

12-PITCH CHANGE GEARS.

No. of Teeth.	With of Face, Size of Hole, Diameter of Hub, Length of Hub,			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
30	\$1.00	1 $\frac{1}{2}$	3	Plain
38	1.07	2 $\frac{1}{4}$	2 $\frac{1}{2}$	"
42	1.11	2 $\frac{3}{4}$	2 $\frac{3}{4}$	"
46	1.15	2 $\frac{3}{4}$	3	"
52	1.22	3 $\frac{1}{2}$	3 $\frac{3}{4}$	"
62	1.30	3 $\frac{3}{4}$	4	Web
70	1.40	4 $\frac{1}{4}$	4 $\frac{1}{2}$	"
78	1.46	4 $\frac{1}{2}$	5	Arms
90	1.58	5 $\frac{1}{4}$	5 $\frac{1}{2}$	"
98	1.65	6 $\frac{1}{4}$	6 $\frac{1}{2}$	"
102	1.71	6 $\frac{3}{4}$	6 $\frac{3}{4}$	"
106	1.80	6 $\frac{3}{4}$	6 $\frac{3}{4}$	"
118	2.12	7 $\frac{3}{4}$	7 $\frac{3}{4}$	"
232	3.78	14 $\frac{1}{2}$	14 $\frac{1}{2}$	"
272	3.43	17	17 $\frac{1}{2}$	"

14-PITCH CHANGE GEARS.

No. of Teeth.	Width of Face, Size of Hole, Diameter of Hub, Length of Hub,			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
50	\$1.28	3 $\frac{1}{2}$	3 $\frac{1}{2}$	Web
54	1.32	3 $\frac{3}{4}$	4	"
58	1.38	4 $\frac{1}{4}$	4 $\frac{1}{2}$	"
62	1.42	4 $\frac{3}{4}$	4 $\frac{3}{4}$	"
70	1.52	5	5 $\frac{1}{2}$	"
74	1.57	5 $\frac{1}{4}$	5 $\frac{1}{2}$	"
76	1.60	5 $\frac{1}{4}$	5 $\frac{1}{2}$	"
84	1.68	6	6 $\frac{1}{2}$	"
98	1.85	7	7 $\frac{1}{2}$	"

14-PITCH CHANGE GEARS.

No. of Teeth.	Width of Face, Size of Hole, Diameter of Hub, Length of Hub,			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
28	\$1.03	2	2 $\frac{1}{2}$	Plain
32	1.08	2 $\frac{1}{4}$	2 $\frac{1}{2}$	"
36	1.12	2 $\frac{1}{2}$	2 $\frac{3}{4}$	"
40	1.17	2 $\frac{3}{4}$	3	"
44	1.21	3 $\frac{1}{4}$	3 $\frac{1}{2}$	Web
48	1.26	3 $\frac{1}{2}$	3 $\frac{3}{4}$	"
52	1.30	3 $\frac{3}{4}$	3 $\frac{3}{4}$	"
56	1.35	4	4 $\frac{1}{2}$	"
60	1.40	4 $\frac{1}{4}$	4 $\frac{1}{2}$	"
64	1.45	4 $\frac{1}{4}$	4 $\frac{1}{2}$	"
68	1.50	4 $\frac{3}{4}$	5	"

14-PITCH CHANGE GEARS—Continued.

No. of Teeth.	Pitch Diam. in. Outside Diam. in. Style.			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
72	\$1.55	5 $\frac{1}{4}$	5 $\frac{1}{4}$	Arms
80	1.65	5 $\frac{3}{4}$	5 $\frac{3}{4}$	"
88	1.74	6 $\frac{1}{4}$	6 $\frac{1}{4}$	"
96	1.85	6 $\frac{3}{4}$	7	"
100	1.90	7 $\frac{1}{4}$	7 $\frac{1}{4}$	"
108	2.08	7 $\frac{3}{4}$	7 $\frac{3}{4}$	"
112	2.18	8	8 $\frac{1}{4}$	"
126	2.55	9	9 $\frac{1}{2}$	"
144	2.97	10 $\frac{3}{4}$	10 $\frac{3}{4}$	"
160	3.33	11 $\frac{1}{4}$	11 $\frac{1}{4}$	"
184	3.85	13 $\frac{1}{4}$	13 $\frac{1}{4}$	"

20-PITCH CHANGE GEARS.

No. of Teeth.	Width of Face, Size of Hole, Diameter of Hub, Length of Hub,			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
34	\$0.97	1 $\frac{1}{4}$	1 $\frac{1}{4}$	Plain
38	1.00	1 $\frac{3}{4}$	2	"
42	1.03	2 $\frac{1}{4}$	2 $\frac{1}{4}$	"
46	1.05	2 $\frac{3}{4}$	2 $\frac{3}{4}$	"
50	1.08	3	2 $\frac{3}{4}$	"
54	1.11	2 $\frac{1}{2}$	2 $\frac{3}{4}$	"
58	1.15	2 $\frac{3}{4}$	3	Web
62	1.17	3 $\frac{1}{4}$	3 $\frac{1}{4}$	"
66	1.21	3 $\frac{3}{4}$	3 $\frac{3}{4}$	"
70	1.23	3 $\frac{3}{4}$	3 $\frac{3}{4}$	"
78	1.29	3 $\frac{3}{4}$	4	"
86	1.36	4 $\frac{1}{4}$	4 $\frac{1}{4}$	"
90	1.38	4 $\frac{1}{4}$	4 $\frac{1}{4}$	Arms
94	1.42	4 $\frac{3}{4}$	4 $\frac{3}{4}$	"
102	1.50	5 $\frac{1}{4}$	5 $\frac{1}{4}$	"
110	1.68	5 $\frac{1}{4}$	5 $\frac{1}{4}$	"
118	1.85	5 $\frac{3}{4}$	6	"
126	2.03	6 $\frac{1}{4}$	6 $\frac{1}{4}$	"
180	2.10	6 $\frac{3}{4}$	6 $\frac{3}{4}$	"

20-PITCH CHANGE GEARS.

No. of Teeth.	Width of Face, Size of Hole, Diameter of Hub, Length of Hub,			
	Each.	Pitch Diam. in.	Outside Diam. in.	Style.
24	\$0.91	1 $\frac{1}{4}$	1 $\frac{1}{4}$	Plain
30	.94	1 $\frac{1}{2}$	1 $\frac{3}{4}$	"
40	1.02	2	2 $\frac{1}{4}$	"
48	1.08	2 $\frac{1}{4}$	2 $\frac{1}{2}$	"
52	1.10	2 $\frac{1}{2}$	2 $\frac{1}{2}$	"
56	1.13	2 $\frac{3}{4}$	2 $\frac{3}{4}$	"
60	1.15	3	3 $\frac{1}{4}$	Web
68	1.22	3 $\frac{1}{4}$	3 $\frac{1}{4}$	"
72	1.25	3 $\frac{1}{2}$	3 $\frac{1}{2}$	"
80	1.32	4	4 $\frac{1}{4}$	"

SPUR GEARS WITH CAST TEETH.

These Gears are suitable for rough machinery and experimental purposes; but not equal in any respect to gears with cut teeth. They are not bored, are exactly as described and cannot be changed in any way. They are made from cut iron patterns, and have fairly smooth surface and clean teeth. Rack comes only in two feet lengths.

12-PITCH WITH $\frac{1}{2}$ INCH FACE.

No. of Teeth.	Each.	Pitch Diam. in.	Style.	Postage.
12	\$0.10	1	Plain	5 cts.
15	.10	1 $\frac{1}{2}$	"	5 "
18	.10	1 $\frac{1}{2}$	"	10 "
21	.10	1 $\frac{1}{2}$	"	10 "
24	.20	2	Web	10 "
27	.25	2 $\frac{1}{2}$	"	15 "
30	.30	2 $\frac{1}{2}$	"	20 "
33	.35	2 $\frac{1}{2}$	"	25 "
36	.40	3	"	30 "
42	.40	3 $\frac{1}{2}$	"	30 "
48	.50	4	"	30 "
54	.50	4 $\frac{1}{2}$	"	30 "
60	.60	5	"	"
66	.60	5 $\frac{1}{2}$	Spoke	"
72	.60	6	"	"
78	.70	6 $\frac{1}{2}$	"	"
84	.70	7	"	"
90	.70	7 $\frac{1}{2}$	"	"
96	.80	8	"	"
108	.90	9	"	"
120	1.10	10	"	"
132	1.30	11	"	"
144	1.50	12	"	"

Rack 40 cts. ft.; $\frac{1}{2}$ inch face; $\frac{1}{16}$ in. thick.

8-PITCH WITH 1 INCH FACE.

No. of Teeth.	Each.	Pitch Diam. in.	Style.	Postage.
12	\$0.15	1 $\frac{1}{2}$	Plain	10 cts.
14	.20	1 $\frac{1}{2}$	"	15 "
16	.25	2	"	15 "
20	.35	2 $\frac{1}{2}$	"	20 "
24	.55	3	Web	25 "
28	.70	3 $\frac{1}{2}$	"	40 "
32	.80	4	"	"
36	.90	4 $\frac{1}{2}$	"	"
40	1.00	5	"	"
48	1.20	6	"	"
56	1.30	7	"	"
64	1.40	8	Spoke	"
72	1.50	9	"	"
80	1.70	10	"	"
96	2.20	12	"	"
128	3.00	16	"	"

Rack 70 cts. per ft.; 1 in. face; $\frac{1}{8}$ in. thick.

6-PITCH, $1\frac{1}{2}$ INCH FACE.

We are prepared to furnish Iron Spur Gears, with cast teeth, in 6-Diam. Pitch. We can furnish these in quite a variety of sizes, from 3 to 30 inches in diameter. We can also furnish Rack, with cast teeth, to correspond. Rack is in 30 inch lengths. Particulars and prices upon application.

4-PITCH, 2 INCH FACE.

We can also furnish Iron Spur Gears with cast teeth, in 4-Diam. Pitch. We can furnish these in sizes from 3 to 36 inches. Suitable Rack, with cast teeth, to correspond. Rack is in 30 inch lengths. Particulars and prices upon application.

A FEW SUGGESTIONS.

The diametral pitch of a gear is the number of teeth to each inch of its pitch diam., and when understood is so simple and convenient, that few gears are now cut by the almost obsolete circular pitch method.

To find outside diameter of Spur Gear Blanks, add two parts of the pitch to the pitch diam., thus: for an 8 pitch gear of 40 teeth, the outside diam. of blank is 42-8ths equal to 5 $\frac{1}{4}$ in.; for a 12 pitch gear of 36 teeth, the outside diam. of blank is 38-12ths equal to 3 $\frac{1}{3}$ in., for a 16 pitch gear of 48 teeth the outside diam. of blank is 48-16ths equal to 3 in. This rule applies to gears of any pitch and if always at hand will insure blanks of the right size, saving time and annoyance.

To obtain the distance between the centers of two gears, add the number of teeth together and divide half the sum by the diametral pitch, thus: If two gears have 40 and 30 teeth respectively, and are 5 pitch, add 40 and 30, making 70, divide by 2 and then divide this quotient 35 by the diametral pitch 5, and the result 7 in. is the distance between centers.

Spur Gear Blanks are always of the same denomination as the pitch. The diam. of 8 pitch gear cannot be in 10ths or 12ths of an inch, nor a 16 pitch in 20ths or 40ths; but a 6 pitch gear is always in 6ths, a 10 pitch in 10ths, a 48 in 48ths, etc., etc.

All information in regard to Gearing will be cheerfully and promptly furnished upon application.

MITER AND BEVEL GEARS WITH
CUT TEETH.

The Miter and Bevel Gears priced and described on this page are made to order, and can usually be furnished on short notice. In ordering give size of hole and length of hub wanted.

By a Pair of Miter Gears we mean two Gears that are practically alike in size, and are intended to work at right angles to each other.

together at right angles, the smaller of the two being called the Pinion.



FIG. 1310. BEVEL GEARS.

Pitch.	Price, per pair.	Pitch Diam. inches.	No. of Teeth.
4	\$5.75	4	16
4	6.70	5	20
4	7.60	6	24
4	8.60	7	28
4	9.50	8	32
5	\$5.05	3	15
5	5.45	4	20
5	6.25	5	25
5	7.00	6	30
5	7.90	7	35
5	8.10	8	40
5	9.80	10	50
6	\$4.45	3	18
6	4.80	3½	21
6	5.10	4	24
6	5.50	4½	27
6	5.85	5	30
6	6.25	5½	33
6	6.60	6	36
8	\$3.50	3	16
8	3.80	2½	20
8	4.00	3	24
8	4.30	3½	28
8	4.65	4	32
8	5.00	4½	36
8	5.30	5	40
8	5.60	5½	44
8	5.95	6	48
10	\$3.85	2½	25
10	3.80	3	30
10	4.00	3½	35
10	4.30	4	40
10	4.55	4½	45
10	4.80	5	50
12	\$3.40	2½	30
12	3.60	3	36
12	3.90	3½	42
12	4.15	4	48
12	4.40	4½	54
12	4.85	5	60

By a Pair of Bevel Gears we mean two Gears of different diameters running
[24]

Pitch.	Price, per pair.	Pitch Diam. inches.	No. of Teeth.
4	\$6.70	6 x 4	24 and 16
4	6.93	8 x 4	32 " 16
4	7.85	10 x 4	40 " 16
4	7.35	9 x 3	36 " 12
4	8.05	12 x 3	48 " 12
4	14.50	24 x 6	96 " 24
5	\$5.88	5½ x 3½	27 and 18
5	6.65	7½ x 3½	36 " 18
5	7.48	9 x 3½	45 " 18
5	7.42	8½ x 2½	42 " 14
5	8.12	9½ x 2½	49 " 14
6	\$5.38	5 x 3½	30 and 20
6	5.95	6½ x 3½	40 " 20
6	6.60	8½ x 3½	50 " 20
6	5.68	8 x 2½	48 " 16
6	6.30	9½ x 2½	56 " 16
8	\$4.34	4½ x 2½	33 and 22
8	4.63	5½ x 2½	44 " 22
8	4.45	6½ x 2½	50 " 20
8	4.90	6½ x 2½	55 " 22
8	4.75	6½ x 2½	54 " 18
8	5.15	7 x 3½	56 " 28
8	5.25	9 x 2½	72 " 18
8	6.05	9 x 4½	72 " 36
10	\$3.78	4 x 2	40 and 30
10	4.03	4 x 3	40 " 30
10	4.15	4½ x 2½	48 " 24
10	4.00	5 x 2	50 " 30
10	4.25	6 x 2	60 " 30
10	4.55	7 x 2	70 " 30
10	4.82	8 x 2	80 " 30
12	\$3.36	2½ x 2½	30 and 26
12	3.50	3½ x 2½	39 " 26
12	4.47	4 x 3½	48 " 40
12	3.84	4½ x 2½	52 " 26
12	4.06	5½ x 2½	65 " 26
12	3.85	5½ x 1½	66 " 22
12	4.10	6½ x 1½	77 " 22
12	4.40	7½ x 1½	78 " 22

SPUR, MITER AND BEVEL GEARS.



FIG. 1311. MITER. FIG. 1312. BEVEL.

On the following pages we present a line of small Gears, suitable for light Machinery of all descriptions, as well as for experimental purposes. They are ready made, and are usually kept in stock for immediate delivery, no changes or variations whatever (from the sizes listed) can be allowed. The slightest change in the hole or hub in any detail, will require a special order and a special price.

We will make special prices based upon quantity, and conditions surrounding the case, upon application.

FINISHED CUT IRON MITER GEARS.

Pitch Diam.	Teeth.	Face.	Hole.	Price, Per pair.	Postage.
$\frac{1}{2}$	18	$\frac{1}{8}$	$\frac{1}{8}$	\$0.60	2 cts.
1	20	$\frac{1}{4}$	$\frac{1}{8}$	.75	5 "
$1\frac{1}{2}$	20	$\frac{1}{4}$	$\frac{1}{8}$	.90	5 "
$1\frac{1}{2}$	22	$\frac{1}{4}$	$\frac{1}{8}$	1.00	10 "
$1\frac{1}{2}$	22	$\frac{1}{4}$	$\frac{1}{8}$	1.25	10 "
2	24	$\frac{1}{2}$	$\frac{1}{8}$	1.50	15 "

FINISHED CUT BRASS MITER GEARS.

Pitch Diam.	Teeth.	Pitch.	Hole.	Face.	Price, Per pair.
$\frac{1}{2}$	15	48	$\frac{1}{8}$	$\frac{1}{8}$	\$0.40
$\frac{1}{2}$	18	48	$\frac{1}{8}$	$\frac{1}{8}$	.45
$\frac{1}{2}$	16	32	$\frac{1}{8}$	$\frac{1}{8}$	.50
$\frac{1}{2}$	24	32	$\frac{1}{8}$	$\frac{1}{8}$	.60
1	24	24	$\frac{1}{4}$	$\frac{1}{8}$	.80
$1\frac{1}{2}$	30	24	$\frac{1}{4}$	$\frac{1}{8}$	.90
$1\frac{1}{2}$	36	24	$\frac{1}{4}$	$\frac{1}{8}$	1.10
2	32	16	$\frac{1}{2}$	$\frac{1}{8}$	1.50

FINISHED CUT BRASS BEVEL GEARS.

Pitch Diam.	Teeth.	Holes.	Face.	Price, Per Pr.
$\frac{1}{2}$ x $\frac{1}{2}$	36 x 12	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	\$0.60
$\frac{1}{2}$ x $\frac{1}{2}$	36 x 18	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.60
1 x $\frac{1}{2}$	48 x 12	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.60
1 x $\frac{1}{2}$	32 x 16	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.60
1 x $\frac{1}{2}$	33 x 22	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.80
1 x $\frac{1}{2}$	32 x 24	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.80
$1\frac{1}{2}$ x $\frac{1}{2}$	48 x 16	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.80
$1\frac{1}{2}$ x $\frac{1}{2}$	36 x 18	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	.90
2 x $\frac{1}{2}$	64 x 16	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.00
2 x 1	48 x 24	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.10
2 x $\frac{1}{2}$	80 x 16	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.20
3 x $\frac{1}{2}$	96 x 16	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.30
3 x $\frac{1}{2}$	72 x 18	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.40
3 x 1	72 x 24	$\frac{1}{8}$ x $\frac{1}{8}$	$\frac{1}{8}$	1.50

UNFINISHED CUT BRASS MITER GEARS.
24 PITCH.

Pitch Diam.	Teeth.	Hole.	Face.	Price, Per pair.
1	24	$\frac{1}{8}$	$\frac{1}{8}$	\$0.50
$1\frac{1}{2}$	36	$\frac{1}{8}$	$\frac{1}{8}$	.75
2	48	$\frac{1}{8}$	$\frac{1}{8}$	1.00
3	72	$\frac{1}{8}$	$\frac{1}{8}$	1.50

UNFINISHED CUT BRASS BEVEL GEARS.

Pitch Diam.	Teeth.	Hole.	Face.	Price, Per Pr.
2 x 1	48-24	$\frac{1}{8}$ - $\frac{1}{8}$	$\frac{1}{8}$	\$0.75
3 x 1	72-24	$\frac{1}{8}$ - $\frac{1}{8}$	$\frac{1}{8}$	1.00
4 x 1	96-24	$\frac{1}{8}$ - $\frac{1}{8}$	$\frac{1}{8}$	1.75
5 x 1	120-24	$\frac{1}{8}$ - $\frac{1}{8}$	$\frac{1}{8}$	2.25
6 x 1	144-24	$\frac{1}{8}$ - $\frac{1}{8}$	$\frac{1}{8}$	3.00

CAST IRON MITER & BEVEL GEARS.

UNFINISHED WITH CAST TEETH.

Pitch Diam.	Teeth.	Face.	Diam. Hub.	Price, Per Pr.	Post.
1 Miter	12	$\frac{1}{8}$	$\frac{1}{8}$	\$0.10	\$0.05
$1\frac{1}{2}$ "	15	$\frac{1}{8}$	$\frac{1}{8}$	.10	.10
$1\frac{1}{2}$ "	15	$\frac{1}{8}$	1	.15	.20
$1\frac{1}{2}$ "	16	$\frac{1}{8}$	$1\frac{1}{2}$	.30	.20
2 "	20	$\frac{1}{8}$	$1\frac{1}{2}$	.35	.20
2 $\frac{1}{2}$ "	22	$\frac{1}{8}$	1 $\frac{1}{2}$	.45	.20
2 $\frac{1}{2}$ "	25	$\frac{1}{8}$	$1\frac{1}{2}$	.50	.30
3 "	24	$\frac{1}{8}$	$1\frac{1}{2}$	.75	.50
$3\frac{1}{2}$ "	29	$\frac{1}{8}$	$1\frac{1}{2}$	1.00	.60
4 "	32	1	2	1.20	.60
5 "	40	1	$2\frac{1}{2}$	1.50	
6 "	48	$1\frac{1}{2}$	$2\frac{1}{2}$	2.00	
$2\frac{1}{2}$ x $1\frac{1}{2}$	30 x 15	$\frac{1}{8}$	1 x $\frac{1}{2}$	.20	.15
$3\frac{1}{2}$ x $1\frac{1}{2}$	42 x 21	$\frac{1}{8}$	$1\frac{1}{2}$ x 1	.60	.30
4 x 2	30 x 15	$\frac{1}{8}$	$1\frac{1}{2}$ x $1\frac{1}{2}$	.75	.40
5 x $2\frac{1}{2}$	40 x 20	$\frac{1}{8}$	$1\frac{1}{2}$ x $1\frac{1}{2}$	1.00	.60
6 x 3	48 x 24	$\frac{1}{8}$	$2\frac{1}{2}$ x $1\frac{1}{2}$	1.25	
8 x 4	64 x 32	$\frac{1}{8}$	$2\frac{1}{2}$ x $2\frac{1}{2}$	2.00	
$4\frac{1}{2}$ x $1\frac{1}{2}$	54 x 18	$\frac{1}{8}$	$1\frac{1}{2}$ x 1	.40	.30
6 x 2	72 x 24	$\frac{1}{8}$	$1\frac{1}{2}$ x $1\frac{1}{2}$	1.00	.60
9 x 3	72 x 24	$\frac{1}{8}$	$2\frac{1}{2}$ x $2\frac{1}{2}$	2.00	
4 x 1	48 x 12	$\frac{1}{8}$	$1\frac{1}{2}$ x $\frac{1}{2}$	.30	.30
6 x $1\frac{1}{2}$	72 x 18	$\frac{1}{8}$	$1\frac{1}{2}$ x $1\frac{1}{2}$	.90	.50
5 x 1	60 x 12	$\frac{1}{8}$	$1\frac{1}{2}$ x $\frac{1}{2}$	.50	.40
6 x 1	72 x 12	$\frac{1}{8}$	$1\frac{1}{2}$ x $\frac{1}{2}$	.60	.50

GEARS FOR PATTERNS—Gears that are to be used as patterns to cast from, require especial treatment and are cut quite differently from regular gears. They are usually a good deal more expensive than gears cut in the regular way, but the castings produced require less work to finish.

If gears are to be used as patterns, please advise us.

BRASS SPUR GEARS.—FINISHED.

Two inches and over have Hubs.

These Gears are very strong, and teeth cut smooth. Webs and spokes unfinished.

FIG. 1313.
FACE VIEW.FIG. 1314.
SIDE VIEW.16 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	No. of Teeth	Hole	Price	Pitch Diam.	No. of Teeth	Hole	Price
$\frac{1}{8}$	8	$\frac{1}{8}$	\$0.20	$\frac{1}{8}$	28	$\frac{1}{8}$	\$0.50
$\frac{1}{4}$	9	$\frac{1}{8}$	.20	$\frac{1}{4}$	32	$\frac{1}{8}$	.60
$\frac{3}{8}$	10	$\frac{1}{8}$	.20	$\frac{3}{8}$	40	$\frac{1}{8}$	.70
$\frac{1}{2}$	12	$\frac{1}{8}$	.20	$\frac{1}{2}$	48	$\frac{1}{8}$	.90
$\frac{5}{8}$	14	$\frac{1}{8}$	.25	$\frac{5}{8}$	56	$\frac{1}{8}$	1.00
1	16	$\frac{1}{8}$	.30	1	64	$\frac{1}{8}$	1.20
$1\frac{1}{8}$	18	$\frac{1}{8}$	.35	$1\frac{1}{8}$	80	$\frac{1}{8}$	1.40
$1\frac{1}{4}$	20	$\frac{1}{8}$	.40	$1\frac{1}{4}$	96	$\frac{1}{8}$	1.70
$1\frac{3}{8}$	22	$\frac{1}{8}$	.40	$1\frac{3}{8}$	128	$\frac{1}{8}$	2.20
$1\frac{1}{2}$	24	$\frac{1}{8}$	.45				

24 PITCH, $\frac{1}{4}$ INCH FACE.

Pitch Diam.	No. of Teeth	Hole	Price	Pitch Diam.	No. of Teeth	Hole	Price
$\frac{1}{8}$	8	$\frac{1}{8}$	\$0.10	$\frac{1}{8}$	30	$\frac{1}{8}$	\$0.35
$\frac{1}{4}$	9	$\frac{1}{8}$	.10	$\frac{1}{4}$	32	$\frac{1}{8}$	.35
$\frac{3}{8}$	10	$\frac{1}{8}$	.10	$\frac{3}{8}$	33	$\frac{1}{8}$	.40
$\frac{1}{2}$	11	$\frac{1}{8}$	.10	$\frac{1}{2}$	36	$\frac{1}{8}$	.45
$\frac{5}{8}$	12	$\frac{1}{8}$	.10	$\frac{5}{8}$	39	$\frac{1}{8}$	.50
1	13	$\frac{1}{8}$	.12	1	40	$\frac{1}{8}$	.55
$1\frac{1}{8}$	14	$\frac{1}{8}$	.12	$1\frac{1}{8}$	42	$\frac{1}{8}$	.55
$1\frac{1}{4}$	15	$\frac{1}{8}$	.15	$1\frac{1}{4}$	48	$\frac{1}{8}$	.60
$1\frac{3}{8}$	16	$\frac{1}{8}$	.15	$1\frac{3}{8}$	54	$\frac{1}{8}$	.65
$1\frac{1}{2}$	18	$\frac{1}{8}$	.20	$1\frac{1}{2}$	60	$\frac{1}{8}$	.70
$1\frac{5}{8}$	20	$\frac{1}{8}$	.30	$1\frac{5}{8}$	66	$\frac{1}{8}$	.80
$1\frac{3}{4}$	21	$\frac{1}{8}$	.25	$1\frac{3}{4}$	72	$\frac{1}{8}$	.90
$1\frac{7}{8}$	24	$\frac{1}{8}$	.25	$1\frac{7}{8}$	84	$\frac{1}{8}$	1.00
2	27	$\frac{1}{8}$	.30	2	96	$\frac{1}{8}$	1.10

GRANT'S GEAR BOOK.

This is a very complete work on the theory and practice of the Teeth of Gears. It is a text book for students, and a working reference book for machinists, draughtsmen, and pattern-makers.

Price, cloth bound, \$1.00.

B. & S. GEAR BOOKS.

"Practical Treatise on Gearing," giving practical explanations and directions in making Gears. Cloth, \$1.00.

"Formulas in Gearing." This supplements the "Practical Treatise on Gearing," and contains formulas for solving the problems that occur in Gearing. Cloth, \$2.00.

32 PITCH, $\frac{1}{2}$ INCH FACE.

Pitch Diam.	No. of Teeth	Hole	Price	Pitch Diam.	No. of Teeth	Hole	Price
$\frac{1}{8}$	8	$\frac{1}{8}$	\$0.10	$\frac{1}{8}$	32	$\frac{1}{8}$	\$0.20
$\frac{1}{4}$	9	$\frac{1}{8}$	.10	$\frac{1}{4}$	36	$\frac{1}{8}$	.25
$\frac{3}{8}$	10	$\frac{1}{8}$	.10	$\frac{3}{8}$	40	$\frac{1}{8}$	.25
$\frac{1}{2}$	11	$\frac{1}{8}$	.10	$\frac{1}{2}$	44	$\frac{1}{8}$	.25
$\frac{5}{8}$	12	$\frac{1}{8}$	.10	$\frac{5}{8}$	48	$\frac{1}{8}$	.30
1	13	$\frac{1}{8}$	.10	1	52	$\frac{1}{8}$	.30
$1\frac{1}{8}$	14	$\frac{1}{8}$	.10	$1\frac{1}{8}$	56	$\frac{1}{8}$	.30
$1\frac{1}{4}$	15	$\frac{1}{8}$	.10	$1\frac{1}{4}$	64	$\frac{1}{8}$	.35
$1\frac{3}{8}$	16	$\frac{1}{8}$	.10	$1\frac{3}{8}$	72	$\frac{1}{8}$	.40
$1\frac{1}{2}$	18	$\frac{1}{8}$	.12	$1\frac{1}{2}$	80	$\frac{1}{8}$	.50
$1\frac{5}{8}$	20	$\frac{1}{8}$	.12	$1\frac{5}{8}$	96	$\frac{1}{8}$	.70
$1\frac{3}{4}$	22	$\frac{1}{8}$	.15	$1\frac{3}{4}$	112	$\frac{1}{8}$	.90
$1\frac{7}{8}$	24	$\frac{1}{8}$	.15	$1\frac{7}{8}$	128	$\frac{1}{8}$	1.00
2	26	$\frac{1}{8}$	.15	2	160	$\frac{1}{8}$	1.25
$2\frac{1}{8}$	28	$\frac{1}{8}$	.20	2	192	$\frac{1}{8}$	1.50
$2\frac{1}{4}$	30	$\frac{1}{8}$	.20				

48 PITCH, $\frac{1}{2}$ INCH FACE.

Pitch Diam.	No. of Teeth	Hole	Price	Pitch Diam.	No. of Teeth	Hole	Price
$\frac{1}{8}$	10	$\frac{1}{8}$	\$0.10	$\frac{1}{8}$	40	$\frac{1}{8}$	\$0.14
$\frac{1}{4}$	12	$\frac{1}{8}$	.10	$\frac{1}{4}$	44	$\frac{1}{8}$	.16
$\frac{3}{8}$	14	$\frac{1}{8}$	.10	$\frac{3}{8}$	48	$\frac{1}{8}$	.20
$\frac{1}{2}$	16	$\frac{1}{8}$	.10	$\frac{1}{2}$	54	$\frac{1}{8}$	.25
$\frac{5}{8}$	18	$\frac{1}{8}$	.10	$\frac{5}{8}$	60	$\frac{1}{8}$	.30
1	20	$\frac{1}{8}$	.10	1	72	$\frac{1}{8}$	.40
$1\frac{1}{8}$	24	$\frac{1}{8}$	.10	$1\frac{1}{8}$	84	$\frac{1}{8}$	.45
$1\frac{1}{4}$	26	$\frac{1}{8}$	.12	$1\frac{1}{4}$	96	$\frac{1}{8}$	.50
$1\frac{3}{8}$	32	$\frac{1}{8}$	.12	$1\frac{3}{8}$	120	$\frac{1}{8}$	.75
$1\frac{1}{2}$	36	$\frac{1}{8}$	.12	$1\frac{1}{2}$	144	$\frac{1}{8}$	1.00

While we show and price in this catalogue a large variety of such Gears as are in most common demand, we have been compelled, on account of lack of space, to leave out a great many sizes that are usually kept in stock.

We issue a small catalogue of 32 pages, which we will mail to any address upon receipt of four cents in stamps. This catalogue relates mainly to different goods than those described in this book, and contains information and prices on such goods as Crown Gears, Ratchets and Pawls, Spirals and Skew Bevel Gears, Rawhide, Aluminum, and Fiberoid Gears, Sheet Brass, Intermittent, and Combination Gears, Worm Gears and Worms, etc., etc.

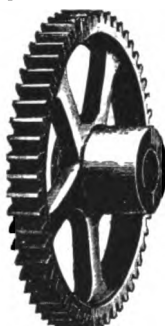


FIG. 1315.

BRASS SPUR GEARS. UNFINISHED.

These gears have the teeth accurately cut; holes bored. Rims and hubs are not finished. They are not made with as much care as the finished gears, but are far superior to any cast gear.

They are very strong for light gears.

These gears, all having hubs, are easily fastened to shaft.

24 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	Teeth.	Hole.	Style.	Price.
$1\frac{1}{2}$	36	$\frac{1}{2}$	Plain	\$0.28
$1\frac{3}{4}$	40	"	"	.30
$1\frac{7}{8}$	42	"	"	.32
2	48	$\frac{5}{8}$	"	.35
$2\frac{1}{4}$	54	$\frac{3}{4}$	Spoked	.40
$2\frac{1}{2}$	60	"	"	.45
$2\frac{3}{4}$	66	"	"	.50
3	72	$\frac{7}{8}$	"	.60
$3\frac{1}{4}$	84	"	"	.70
$3\frac{1}{2}$	96	"	"	.80
$4\frac{1}{4}$	108	"	"	.90
5	120	"	"	1.00
$5\frac{1}{4}$	132	"	"	1.10
6	144	"	"	1.20
7	168	$\frac{1}{2}$	"	1.40
8	192	"	"	1.60
10	240	"	"	2.00
12	288	"	"	2.50



FIG. 1316. BRASS PINION WIRE.

MACHINE CUT TEETH, 1 FT. LENGTHS.

24 PITCH.		32 PITCH.		48 PITCH.	
Teeth.	Price.	Teeth.	Price.	Teeth.	Price.
8	\$0.60	8	\$0.50	8	\$0.40
10	.80	10	.60	10	.40
12	1.00	12	.70	12	.50
14	1.10	14	.80	14	.50
16	1.15	16	.90	16	.60
18	1.20	18	.90	18	.60
20	1.40	20	1.00	20	.70
22	1.60	22	1.10	22	.80
24	2.00	24	1.20	24	1.00



FIG. 1317. BRASS RACK.

Square.	Pitch.	Per Inch.
$\frac{1}{8}$ inch	16	\$0.08
$\frac{3}{16}$ "	24	.06
$\frac{1}{4}$ "	32	.05
$\frac{5}{16}$ "	48	.05

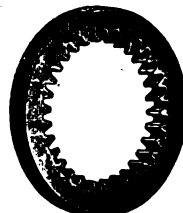


FIG. 1318.

FINISHED, CUT, BRASS INTERNAL GEARS.

16 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	Teeth.	Outside Diam.	Price.
2	32	$2\frac{1}{2}$	\$1.90
$2\frac{1}{4}$	40	$3\frac{1}{4}$	2.00
3	48	$3\frac{3}{4}$	2.25
4	64	$4\frac{1}{2}$	2.50
6	96	$6\frac{1}{2}$	3.50

24 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	Teeth.	Outside Diam.	Price.
$1\frac{1}{2}$	36	$2\frac{1}{2}$	\$1.60
2	48	$2\frac{3}{4}$	1.70
$2\frac{1}{4}$	60	$3\frac{1}{4}$	1.80
3	72	$3\frac{3}{4}$	2.00
4	96	$4\frac{1}{2}$	2.25
6	144	$6\frac{1}{2}$	3.00

32 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	Teeth.	Outside Diam.	Price.
1	32	$1\frac{1}{2}$	\$1.25
$1\frac{1}{4}$	48	2	1.25
2	64	$2\frac{1}{4}$	1.50
$2\frac{1}{4}$	80	$3\frac{1}{4}$	1.60
3	96	$3\frac{3}{4}$	1.70



FIG. 1319.

FIG. 1320.

BRASS RATCHETS.

16 PITCH, $\frac{1}{8}$ INCH FACE.

Pitch Diam.	Teeth.	Hole.	Price.
$\frac{1}{2}$	12	$\frac{1}{8}$	\$0.25
1	16	$\frac{1}{4}$	.40
$1\frac{1}{4}$	20	"	.50
$1\frac{1}{2}$	24	"	.70
2	32	$\frac{3}{8}$	.90
3	48	$\frac{1}{2}$	1.50

BRASS RATCHETS—Continued.**24 PITCH, $\frac{1}{2}$ INCH FACE.**

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	12	$\frac{1}{8}$	\$0.20
$\frac{3}{4}$	18	"	.25
1	24	$\frac{1}{4}$	.35
$1\frac{1}{2}$	30	"	.40
$1\frac{3}{4}$	36	"	.50
2	48	$\frac{3}{8}$	.70
3	72	$\frac{1}{2}$	1.20

32 PITCH, $\frac{3}{4}$ INCH FACE.

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	16	$\frac{3}{8}$	\$0.20
$\frac{3}{4}$	24	"	.25
1	32	$\frac{1}{2}$	.30
$1\frac{1}{2}$	40	"	.35
$1\frac{3}{4}$	48	"	.40
2	64	$\frac{3}{4}$	.60
3	96	$\frac{1}{2}$	1.10

48 PITCH, $\frac{1}{2}$ INCH FACE.

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	24	$\frac{3}{8}$	\$0.20
$\frac{3}{4}$	36	"	.25
1	48	$\frac{1}{2}$	.35
$1\frac{1}{2}$	60	"	.40
$1\frac{3}{4}$	72	"	.50
2	96	$\frac{3}{4}$	.70



1321. WORM. Worm, $\frac{1}{2}$ pitch diameter, 16 diametral pitch. $\frac{1}{2}$ face, $\frac{1}{8}$ hole. Will fit any spur gear cut 16 p. Price, Brass, 50 cents each; Steel, \$1.00 each.

BRASS WORM GEARS, WITH $\frac{1}{8}$ CONCAVE FACE, 16 D. PITCH.

Pitch Diam.	No. Teeth.	Hole.	Price.
$1\frac{1}{2}$	20	$\frac{1}{4}$	\$1.50
$1\frac{3}{4}$	30	$\frac{1}{8}$	1.70
$2\frac{1}{4}$	40	"	2.00
$3\frac{1}{4}$	50	$\frac{3}{8}$	2.50
5	80	"	3.00

BRASS WORM GEARS, WITH $\frac{1}{2}$ CONCAVE FACE, 24 D. PITCH.

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	20	$\frac{1}{8}$	\$1.25
$1\frac{1}{2}$	30	"	1.50
$1\frac{3}{4}$	40	$\frac{1}{4}$	1.75
$2\frac{1}{4}$	50	$\frac{3}{8}$	2.00
3	72	"	2.50
4	96	$\frac{1}{2}$	3.00

Worm gears with concave face are not interchangeable with worms of different diameters, but are made to fit only the list worms.



FIG. 1322.

BRASS CHAIN WHEELS AND CHAINS.

FIG. 1323.

BRASS WHEELS, $\frac{1}{2}$ FACE. CUT TEETH.

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	8	$\frac{1}{8}$	\$0.20
$\frac{3}{4}$	10	"	.25
$1\frac{1}{2}$	12	"	.25
$1\frac{3}{4}$	16	$\frac{1}{4}$	.30
$1\frac{3}{4}$	20	"	.40
2	24	$\frac{3}{8}$	.60
3	32	"	1.00
4	44	$\frac{1}{2}$	1.25

FIG. 1324. BRASS CHAIN, NO. 1.
10 cents per ft.

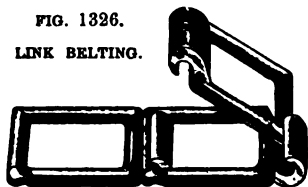
This Chain suits the above list of wheels.

BRASS WHEELS, $\frac{3}{4}$ FACE. CUT TEETH.

Pitch Diam.	No. Teeth.	Hole.	Price.
$\frac{1}{2}$	6	$\frac{1}{8}$	\$0.20
$\frac{3}{4}$	8	"	.20
$1\frac{1}{2}$	10	"	.40
$1\frac{3}{4}$	12	$\frac{1}{4}$	.50
$1\frac{3}{4}$	16	"	.60
$2\frac{1}{2}$	20	$\frac{3}{8}$	.70
$2\frac{1}{2}$	24	"	1.00
3	27	"	1.25
4	36	$\frac{1}{2}$	1.50
5	45	"	1.60
6	54	"	1.80
8	72	"	2.00

FIG. 1325. BRASS CHAIN, NO. 2.
12 cents per ft.

This Chain suits the wheels with $\frac{1}{2}$ inch face.

FIG. 1326.
LINK BELTING.

The Link Belting, or Sprocket Chain, can be separated by simply folding the links almost double and sliding them apart, as shown in Fig. 1326.

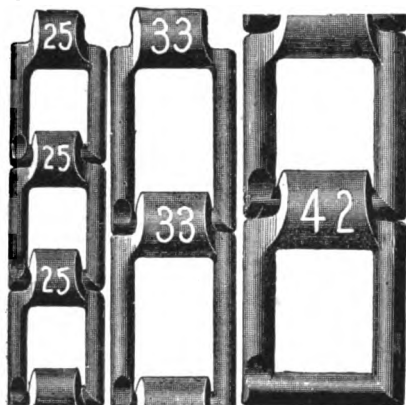
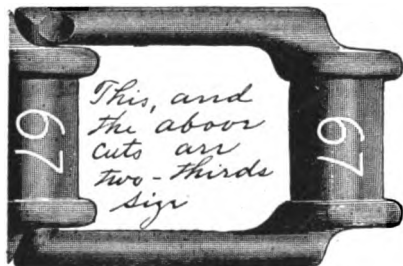
NO. 25.
FIG. 1327.NO. 33.
FIG. 1328.NO. 42.
FIG. 1329.

FIG. 1330. NOS. 67 AND 77.

The above cuts are two-thirds size.

DIMENSIONS OF LINK BELTING.

We have made up the following table, giving the dimensions and working strains of a number of sizes of Link Belting. The number or size is cast in top of link, as shown in Fig. 1330 :

No.	Size Outside.	No.	Size Outside.
25	$\frac{1}{2}$ x $1\frac{1}{2}$	66	$1\frac{1}{2}$ x $2\frac{1}{2}$
33	$\frac{1}{2}$ x $1\frac{1}{2}$	67	$1\frac{1}{2}$ x $2\frac{1}{2}$
33	$\frac{1}{2}$ x $1\frac{1}{2}$	75	2 x $3\frac{1}{2}$
35	$1\frac{1}{2}$ x $1\frac{1}{2}$	77	$1\frac{1}{2}$ x $2\frac{1}{2}$
42	$1\frac{1}{2}$ x $1\frac{1}{2}$	78	$2\frac{1}{2}$ x $3\frac{1}{2}$
45	$1\frac{1}{2}$ x 2	88	$2\frac{1}{2}$ x $3\frac{1}{2}$
52	$1\frac{1}{2}$ x 2	93	$2\frac{1}{2}$ x 5
55	$1\frac{1}{2}$ x 2	103	$3\frac{1}{2}$ x $4\frac{1}{2}$
57	$1\frac{1}{2}$ x $2\frac{1}{2}$	108	$4\frac{1}{2}$ x 6



A-1.



K-1.



K-6.



F-2.



C-1.



E-1.

FIG. 1331. LINK BELT ATTACHMENTS.

The following list gives sizes of Chain for which Attachments can be used :

A-1,	Nos. 33, 42, 45, 55, 67.
K-1,	" 25, 33, 45, 55, 67, 77, 78, 88
K-6,	" 25, 33, 42.
F-2,	" 55, 67, 77, 78, 88
C-1,	" 25, 42, 45, 55.
E-1,	" 25, 33, 45, 55, 67, 77, 78.

LINK BELTING.

We illustrate a number of sizes of Link Belting and Attachments, but can furnish a great many other sizes besides those shown here; and also a large variety of Sprocket wheels.

Nos. 55, 77 and 78 are the same dimensions as Nos. 45, 67 and 88, but are heavier and will stand a greater working strain. Same Sprocket Wheels answer for both.

PRICE OF LINK BELT AND ATTACHMENTS.

No.	Per Ft.	Attachments, Each.	Working Strain.
25	\$0.10	\$0.02	75 lbs.
33	.10	.03	200 "
42	.12	.03	300 "
45	.12	.03½	350 "
55	.16	.04	450 "
67	.20	.07	700 "
77	.24	.07	800 "
78	.28	.11	1000 "
88	.35	.13	1200 "



FIG. 1332. SPROCKET WHEELS.

Following prices are for the Sprocket Wheels in the rough, not bored or set screwed. Will name prices on Finished Wheels upon application :

No. 25.

Pitch Diam.	No. of Teeth.	Price, Each.
2	7	\$0.24
2½	8	.26
3	9	.28
3½	11	.33
4	12	.35
4½	14	.39
5	16	.46
6	21	.60
7½	26	.78
8	28	.84
10	35	1.00
12	42	1.25
16	56	1.70

No. 83.

Pitch Diam.	No. of Teeth.	Price, Each.
3	7	\$0.38
4	9	.42
4½	10	.48
5½	12	.64
6½	15	.85
7	16	.90
8½	19	1.05
9½	22	1.12
12	27	1.50
15½	34	1.90
18½	41	2.40
24	54	3.35

No. 42.

Pitch Diam.	No. of Teeth.	Price, Each.
3	7	\$0.40
3½	9	.46
4½	11	.58
5½	13	.68
6½	14	.72
8	18	1.00
9½	22	1.22
11½	27	1.52
14	32	1.82
15½	36	2.00
18	41	2.56
24	55	3.80

Nos. 45 and 55.

Pitch Diam.	No. of Teeth.	Price, Each.
3	6	\$0.40
3½	8	.54
5½	10	.62
6	12	.70
7½	14	.96
8½	16	1.12
9½	18	1.22
10½	20	1.36
12	23	1.60
14½	27	1.92
16	31	2.05
18½	35	2.56
20½	39	2.86

Nos. 67 and 77.

Pitch	No. of Teeth.	Price, Each.
4½	6	\$0.62
6	8	0.88
7½	10	1.05
8½	12	1.20
11	15	1.65
14	19	2.10
16½	22	2.60
18½	25	3.20
20	28	3.80
24½	33	4.50
28	38	6.20
32½	44	7.40

Nos. 78 and 88.

Pitch	No. of Teeth.	Price, Each.
6½	8	\$1.06
8½	10	1.25
10	12	1.55
11½	14	2.06
14½	17	2.56
16½	20	2.92
20	24	3.90
24	29	4.84
28½	34	6.54
30½	37	8.12
33½	40	9.16
37	44	10.00

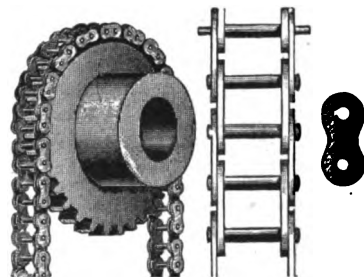


FIG. 1333. STEEL COG WHEEL CHAIN.

This is a fine running chain for light machinery where a steady, positive motion is desired. It is made in two sizes. Price of either size, 35 cents per ft.

No. 41 43
Length between centers, 1½ inch, 1½ inch
Width between links, 1½ " 1½ "
Width over all, 1½ " 1½ "

We can furnish Wheels with cut teeth for the above Chain, and usually carry in stock the following sizes for No. 41 Chain:

Diam. 1½ 2 2½ 3½ 3½ 5 6
Teeth, 10 15 20 25 30 40 50
Each, \$0.35 .45 .55 .65 .75 1.00 1.25

These Wheels are bored ½ inch hole, and we charge extra when special size holes are required, and 15 cents each for tapping and set screwing when required.



FIG. 1334. NO. 31 CHAIN.

This Chain is made of steel and is quite strong. Price, per ft., 15 cents.



FIG. 1335. STEEL BLOCK CHAIN.

This style of Chain is used more for Bicycles than anything else. We have three sizes: $\frac{1}{2}$, which is made of tool steel; $\frac{3}{4}$ and $\frac{1}{4}$, made of steel, case-hardened. These chains come in lengths of 51 inches, and are priced at \$3.00 for the $\frac{1}{2}$ inch tool steel, and \$2.25 for the $\frac{3}{4}$ and $\frac{1}{4}$. When we cut lengths, we charge by the foot as follows: $\frac{1}{2}$ inch, 85 cents; $\frac{3}{4}$, 60 cents; $\frac{1}{4}$, 60 cents.



FIG. 1336. PULLEY CHAINS

FIG. 1337.
EYE END FASTEN'G

FIG. 1338.

The above illustrations show a style of cable chain suitable for running on pulleys. These chains are used for suspending doors, sashes, gates, and heavy weights, taking the place of rope.

No.	Steel, Per Foot.	Copper, Per Foot.	Working Strain.
30	\$0.10	\$0.12	125 lbs.
10	.14	.17	250 "
110	.17	.23	400 "
4	.20	.30	500 "
5	.22		800 "
6	.30		1000 "

Fastenings for Chains Nos. 30 to 110, as shown in Fig. 1338, 15 cents each; for Nos. 4, 5 and 6, 40 cents each. Pulleys for Cable Chains Nos. 30 to 110, 35 cents each; for Nos. 4 and 5, 65 cents each; and for No. 6, \$2.00 each.

Eye End Fastenings, Fig. 1337, for Chains 30, 10 and 110, 7 cents each.



FIG. 1339. CHAMPION SASH CHAIN.

Above cut shows the Champion Sash Chain; this is made out of Morton metal (which is a fine bronze composition), and is very strong and durable. The No. 1 is suitable for sashes and doors not exceeding 90 lbs. Price, 6 cents per ft. We can furnish quite a variety of pulleys suitable for this chain. Fastenings, 7 cents each. Can furnish this Chain in other sizes, also made of steel.



FIG. 1340. MACHINE CHAIN.

The above is a rather poor cut of what is known as Machine chain; it is a welded link chain, and is used largely by machine manufacturers for running over pulleys to hold counterbalance weights.

No.	2-0	1	3
Per 100 ft.,	\$11.80	\$10.70	\$10.00
Per ft.,	.15	.14	.13



FIG. 1341. TRIUMPH CHAIN.

The Triumph Coil Chain has in a large measure taken the place of the imported German and English welded chain. This chain is made of steel wire by special machinery, and is as strong again as the welded chain. It cannot well be used to run over pulleys, on account of the length of the links.

No.	Per 100 Feet.	Per Foot.	Width About	Breaking Strain.
6-0	\$8.10	\$0.10	$\frac{1}{2}$	3,800 lbs.
4-0	6.00	.08	$\frac{3}{4}$	2,200 "
2-0	4.05	.06	$\frac{1}{2}$	1,650 "
1	3.15	.05	$\frac{1}{4}$	1,100 "
3	2.55	.05	$\frac{1}{2}$	750 "
5	2.35	.04	$\frac{3}{4}$	500 "
7	2.30	.04	$\frac{1}{2}$	300 "

Samples of Chain (excepting Block Chain, Fig. 1335) sent by mail on receipt of 10 cents.



FIG. 1342. SINGLE JACK CHAIN.



FIG. 1343. DOUBLE JACK CHAIN.



FIG. 1344. SAFETY CHAIN.

We can furnish the Single and Double Jack Chain in iron, brass, and brass silver-plated. Safety Chain in brass and plated. Prices upon application.



FIG. 1345. CABLE CHAIN.

There are three grades of Cable Chain made regularly, known as Common, Proof, and BB Crane. Perhaps over 75 per cent of all the chain used and sold is of the common quality.

Proof chain is both stronger and better than Common. For many—in fact for most—purposes, Common and Proof chains answer very well.

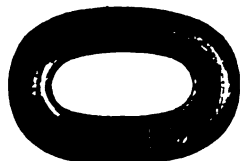
The BB Crane chain is very much stronger and better in every way than the others, and, although considerably higher in price, is worth the difference.

We Carry in stock nothing but BB Crane chain. All sizes $\frac{1}{4}$ inch and smaller are made from mild steel; larger sizes of refined iron. Sizes given are diameter of stock from which the chain is made.

Size,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Per lb. \$0.12	.10	.08	.07 $\frac{1}{2}$	.07	.07
Size,	$\frac{7}{8}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
Per lb. \$0.06 $\frac{1}{2}$	.06	.06	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	

Average weight per hundred ft. in lbs.:

	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
40 70 110 150 200 250 400 550 850 1080									



1346. CONNECTING LINK. These Connecting Links, often called Cold Shuts, are used for repairing broken chains; are of the Thompson pattern, and are made of malleable iron.

Size,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
Dozen, \$1.00	1.05	1.10	1.25	1.45	1.70	2.90
Each,	.10	.10	.12	.13	.15	.17 .23

LEATHER BELTING.

The following article was recently printed in a mechanical journal, and we reproduce it here as being of interest to those who use Belts:

"Of course you have more or less (usually more) trouble with your belts, but it is generally your fault. You always dread putting on a new belt; it will stretch, and sometimes it stretches on one side to a degree that drives you nearly frantic; but that's your fault: Why did you buy belts of that fellow that offered such big discounts? Haven't you been in business long enough to know that you don't get bargains in every day affairs, you pay for what you get. Those belts of yours come from well down on the side of the hide; I don't know but that they were cut from the belly, from the way they act. Why! they are not even fit for trunk straps.

There's reason in all things. Unreason, too, for that matter; and the reason why a belt from the back is better than one from the belly lies in the simple fact that the growth of the skin on the back is slow and even; it is subjected to no sudden strains; it is never distended except for abnormal reasons; it lies close to bone and muscle. As you come down the sides, the skin is in constant motion from breathing and the twisting of the body, until when the belly is reached you have an exceedingly elastic bag, holding up the intestines, stretching and contracting with every meal that is eaten and digested; tremendously distended when the animal is with calf, and withal especially suited for the place. Don't think then that just because the animal is dead and because its skin has been soaked in a tanning liquid more or less skillfully prepared that the innate nature is to be changed; that piece of leather will be stretchy and unevenly so, to the end of time, and you who love big discounts might as well make up your mind to the same and accept the advice not to run counter to Nature's laws. Just make them work for you, and when they won't, don't make a fool of yourself by trying to set up a little universe of your own. It won't work.

Now that you have a well-stretched belt cut from the back in place, don't lay back on your oars and expect it to run forever without any further attention. Nature's laws have been complied with and you

are all right, but she is a wily old dame and has a host of chemical laws that are insidiously at work to harden and deteriorate your belt. A belt dressing of some sort must usually be used; but don't buy the first jimcrack that a peddler with a glib tongue, and who knows less about belts than you did in the days when you cherished big discounts and bought belly belts, may offer you. Apply the dressing occasionally by rubbing on, and discharge the first man on sight whom you may chance to catch putting rosin on your belts. Of all things rosin is about the worst. It has not one saving grace, and it will do more damage to the square inch than any other compound that the malevolent fiends of the machine shop ever suggested to the lazy dog who is too indolent to take a piece out of the belt to prevent it from shipping."

E. F. HOUGHTON & CO'S ADHESIVE BELT DRESSING.

The following are some of the advantages claimed for this article:

It is not a pasty or gummy grease, but a bright, golden-colored oil, which can be applied to the belt with a sponge or brush at any temperature above zero, the least quantity that will produce the desired effect being the most that need be used.

It will make a belt soft and strong, and will increase its durability.

Belts having become gummed or hardened by the use of gummy or pasty dressings, castor oil, etc., will become soft and pliable after a few applications of this dressing.

The difficulty arising from lubricating oils getting upon the belts, making them slip and soggy, will, in a great measure be remedied by the use of this dressing, as, owing to its penetrative nature and its natural affinity for leather, it will enter the pores of the belt and drive the other oils to the surface, from which they can be wiped. This makes it of the greatest value to Electric Light Companies, where this difficulty gives endless trouble.

Proprietors of saw mills, flour mills, etc., who have been troubled by the accumulation of considerable dust upon their belts, will find that the use of this dressing will lessen this difficulty. It will give the strongest possible grip to a belt, preventing all slipping, and in a great measure do away with the necessity

of pulley coverings, saving that expense.

The fact that many of the largest Electric Light Companies are using this dressing is one of the best evidences of its superior quality, as it is a well known fact that belts running electrical machinery are the most difficult to keep in order.

Notwithstanding the superior merits of this dressing, it is much lower in price than dressing of less merit, the price being \$1.50 per gallon, and as it weighs about 8 lbs. to the gallon, less than 19 cents per lb. We mention this fact that manufacturers may not be deceived in comparing the price of this dressing with the price of those selling at from 25 to 75 cents per lb.

Five gallons, or 40 lbs., of this dressing will last longer than 100 lbs. of any of the greases sold for belt-dressing purposes. Price, per gallon, \$1.50.

LEATHER BELTING.



FIG. 1347.

We handle only the J. B. Hoyt & Co's Oak-tanned, Strictly Short Lap Leather Belting. This Belting has been on the market for nearly a half of a century, and during the entire time has been the recognized standard of excellence.

The Fayerweather & Ladew Co., who manufacture this Belt, are the largest producers of Oak-tanned Leather in the world. They have twelve tanneries in active operation, and during the past year turned out over twelve million dollars' worth of oak tanned-leather.

We believe that this is the only concern in the country manufacturing nothing but strictly Short Lap Leather Belting; and for this reason there is no danger of our customers getting inferior belts.

In this connection we wish to state that a high-grade Belt should weigh not less than 16 oz. to the square foot.

"SHORT LAP" BELTING.

In the broad sense of the term "short

lap" would seem to indicate two short laps joined together. This is, however, erroneous, as applied to belting. Many of our customers are doubtless aware of this; but in order to avoid any misconception of the term, we deem it best to make the following explanation:

By reference to cut of hide, Fig. 1348, showing the part of center of the hide which is used in the construction of Hoyt's belting, it will be apparent at a glance, that these centers do not embrace any portion of the shoulder—which

lacks in firmness and substance—but consist only of the best part of the hide, embodying uniformity in thickness and tensile strength. No centers exceed four feet two inches in length when cut from the rough hide.

This represents the best stock obtainable for leather belting, and is called "Short Lap." A great deal so-called first-class belting is sold as "short lap," containing a large portion of the shoulder, which, aside from perhaps an inferior tannage, adds very serious defects, caused by the inequality of substance and tensile strength, rendering the life of such a belt of very brief duration.

HOYT'S "EXTRA HEAVY" OAK-TANNED

PRICE LIST OF SINGLE BELTS.

Width In.	Per Foot.	Width. In.	Per Foot.	Width In.	Per Foot.
1	\$0.05½	4	\$0.28	14	\$1.01
1½	.07½	4½	.31	16	1.19
1¾	.09½	5	.35	18	1.39
2	.11	6	.42	20	1.58
2½	.13	7	.50	24	1.97
3	.14½	8	.57	30	2.58
3½	.17	9	.64	36	3.17
4	.20	10	.72	40	3.56
4½	.24	12	.86	48	4.34

Double Belts twice the price of single

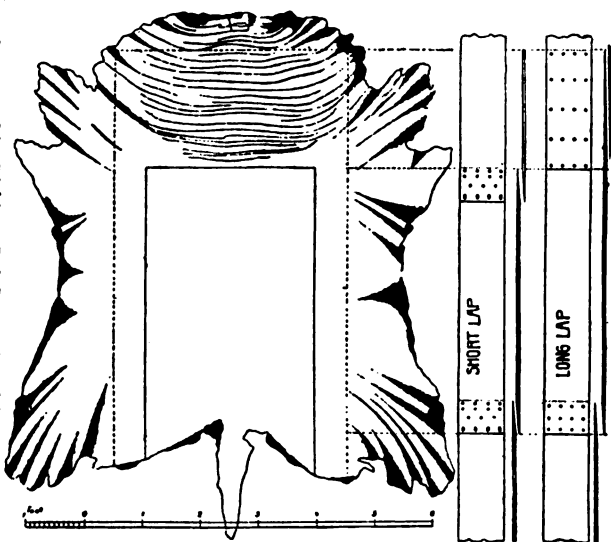


FIG. 1348. SHOWING HIDE.

HOYT'S "REGULAR" LEATHER BELTING.

This Belting is the same quality in every way as the other, but is made from lighter hides, and is especially adapted for wood-working and high-speed machinery.

PRICE LIST OF SINGLE BELTS.

Width In.	Per Foot.	Width In.	Per Foot.	Width In.	Per Foot.
1	\$0.05	2½	\$0.10½	7	\$0.45
1½	.06½	3	.18	8	.51
1¾	.08½	3½	.21½	9	.58
2	.10	4	.25	10	.65
2½	.11½	4½	.28	12	.78
3	.13	5	.31½	14	.91
3½	.15	6	.38	16	1.07

Double Belts twice the price of single.

HOYT'S "LIGHT DOUBLE" LEATHER BELTING

This Belt is made of strictly high-grade stock, and will weigh about 21 ozs. to the square ft. It is made in all widths up to, and including, 12 inch. To obtain price, add 50 per cent to the list of Single, Extra Heavy Leather Belting in opp. column.

For Electrical, and in fact all high-speed machinery, the Belting used should be a cemented belt, without rivets or metallic fastenings of any kind.

Belts made in this way run with less noise, wear better, and are preferable in every way to the riveted belts.

ROUND LEATHER BELTING.



FIG. 1349. SOLID.

Diam.	Per Ft.
$\frac{1}{4}$	\$0.03
$\frac{1}{2}$	.04
$\frac{3}{4}$	.06
$\frac{1}{2}$	.08
$\frac{3}{4}$	.11



FIG. 1350. TWISTED.

Diam.	Per Ft.
$\frac{1}{4}$	\$0.08
$\frac{1}{2}$	.13
$\frac{3}{4}$	.17
$\frac{1}{2}$	.21
$\frac{3}{4}$	.27
$\frac{1}{2}$	.33

FIG. 1351.
STEEL COUPLINGS
FOR
ROUND BELTS.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Dozen,	\$2.00	\$1.65	\$1.35	\$1.65
Each,	.20	.17	.14	.17
Size,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Dozen,	\$2.00	\$2.70	\$4.00	\$6.00
Each,	.20	.27	.40	.60

Intermediate and larger sizes furnished.

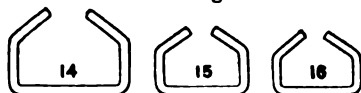


FIG. 1352. SEWING MACHINE BELT HOOKS.

No.	14	15	16	17
Per 1000,	\$1.50	\$1.25	\$1.00	\$0.75
Per 100,	.20	.16	.14	.12

BELT FASTENERS.

There are almost innumerable kinds and styles of Belt Fasteners in the market, and we show here a larger line than we like to. It seems almost singular, in spite of the dozens of new styles of Fasteners, for which all sorts of advantages are claimed, that the Rawhide Lace and older styles of Belt Fasteners are still preferred by most users, but such nevertheless, is the case, and the only thing we show here in the way of what might be termed a new style of Fastener, is the Bristol's Steel Belt Lacing, Fig. 1360.

Many of our customers are using this

Fastener, and prefer it to any of the malleable iron fasteners commonly sold.

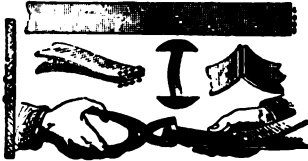


FIG. 1353. BLAKE'S BELT STUDS.

The genuine Improved Blake's Belt Studs are made by Greene, Tweed & Co. They are considerably higher in price than the imitation, but are stronger and better in every way. The sizes in most common use are the Nos. 0 to 3, Nos. 1 and 2 selling about equally well for general purposes.

No.	4	3	2	1	0	00
Per 100,	\$0.60	.68	.94	1.23	1.50	1.87
Per Doz.,	.10	.12	.16	.20	.25	.30

EMPIRE BELT STUDS.

The Empire Belt Studs are made by the same concern, in order to meet the competition of others on cheaper goods. They are, we believe, equal to any Belt Stud made, excepting the Improved Blake's.

No.	3	2	1	0	00
Per 100,	\$0.45	.63	.83	1.00	1.25
Per Doz.,	.08	.10	.13	.17	.20

CUTTERS FOR BELT STUDS.

Small size, for leather belts, 80 cents; large size, for rubber belts, \$1.10.

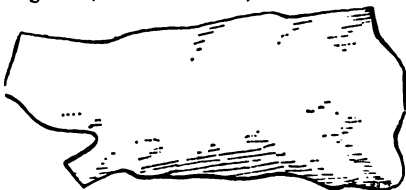


FIG. 1354. LACE LEATHER.

We handle nothing but the best quality of Rawhide Lace Leather.

Sides contain 10 to 16 ft. Price per square ft., 20 cents.



FIG. 1355. CUT LACE LEATHER.

This comes in packages, each package containing 100 ft. of lacing.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Per 100 ft.,	\$0.50	.63	.75	1.00	1.38	1.63



FIG. 1356. SMITH'S BELT FASTENERS.

These come in boxes of 100.

No. 4, \$1.00, for all single leather belts.

No. 3, 1.20, for ordinary rubber belts.

No. 2, 1.40, for cotton elevator belts.

No. 1, 1.60, for large heavy drive belts.

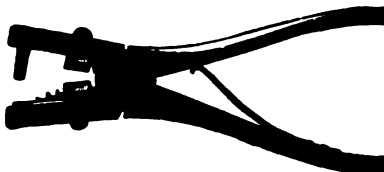


FIG. 1357. COMBINATION PUNCH.

This Punch is made especially for the Smith Belt Fasteners, but will be found useful for other purposes. Price, \$1.10.



FIG. 1358. REAMER.

For taking out Fasteners without cutting belt. With the aid of this tool, the same Fastener can be used a number of times. Price of Reamer, \$0.35.



FIG. 1359. POINTED BELT HOOKS.

No.	3	4	5	6	7	8
Lgth.	2 1/2			1 1/2		1 1/2
Per M.	\$1.80	\$4.20	\$3.30	\$2.55	\$1.50	\$1.50
Per 100.	.60	.55	.45	.35	.30	.25
No.	9	10	11	12	13	14
Lgth.	1 1/2			1 1/2		1 1/2
Per M.	\$1.20	\$1.05	\$0.90	\$0.84	\$0.78	\$0.72
Per 100.	.18	.15	.13	.12	.11	.10



FIG. 1360. BRISTOL'S STEEL BELT LACING.

This comes packed 100 inches in a box, assorted lengths.

No. 0, per box, \$0.60, for split leather and light belts.

No. 1, per box, \$0.90, for ordinary single belts.

No. 2, per box, \$1.20, for extra heavy and wide single belts.

No. 3, per box, \$1.50, for double belts.

No. 4, per box, \$1.80, for heavy double belts.

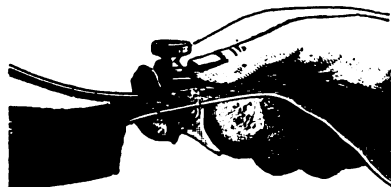


FIG. 1361. LACE CUTTER, \$0.50.

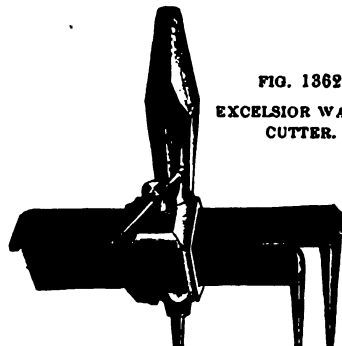


FIG. 1362.

EXCELSIOR WASHER CUTTER.

Small size, cuts to 6 inch, \$0.85.

Large size, cuts to 8 inch, \$1.00.

GLEASON'S PATENT WASHER CUTTER.

A good tool; has a Spring Attachment for throwing out center, \$0.90.

CINCINNATI WASHER AND GASKET CUTTER.

This is adapted for cutting washers and gaskets from 4 to 20 inches in diameter, \$1.50.

FOR BELT PUNCHES, SEE PAGES 187-188.

" " CLAMPS, SEE PAGE 171.

" " CEMENT, SEE GLUE.

" " RIVET SETS, SEE PAGE 187

TEARING CATALOGUE.—Each article in this book is designated by either a figure number, stock number or both. Please do not cut or deface this book. Order goods by figure or stock number.

SOLID COTTON BELTING.

Width, inches.	2-Ply.	4-Ply.
2	\$0.04	
3	.06	\$0.08
4	.07½	.10½
5	.09½	.13
6	.11½	.15
7	.13½	.17
8	.15½	.19
10		.25
12		.30

We can furnish Solid Cotton Belting up to 24 inches in width, and in thickness from 2 to 6-Ply. Prices upon application.

We can also furnish the various makes of special Cotton Belts, such as the Gandey, Triumph and Economy brands.

RUBBER BELTING, HOSE & PACKING.

In the handling of Rubber Belting, Hose and Packing, we have followed out the same policy as pursued by us in the handling of leather belt. We sell nothing but the highest grade, made by the Boston Belting Co. This firm has been in business since 1828, and we believe that their product is superior to that of all other manufacturers. If our customers are satisfied with cheap, poor goods in this line, they will have to look elsewhere.

**FIG. 1363. RUBBER BELTING.**

Width.	2-Ply.	3-Ply.	4-Ply.	5-Ply.
1	\$0.03½			
1½	.04½			
1½	.05½			
1½	.06½			
2	.07½	\$0.08½		
2½	.09	.11		
3	.11	.13		
3½		.15	\$0.18½	
4		.17	.21	
5		.21½	.26	
6		.26	.31	
7		.30	.36½	
8		.35	.42	\$0.52½
10			.53½	.66½
12			.65	.81

We can furnish all sizes up to 60 inches in width, and up to 8-Ply in thickness.

**FIG. 1364. RUBBER HOSE.****HYDRANT, FIRE AND ENGINE HOSE.**

Diam. Inside.	3-Ply.	4-Ply.	5-Ply.
½ inch	\$0.18	\$0.22	\$0.27½
1 "	.24	.30	.37
1½ "	.30	.37	.46
1½ "	.36	.45	.56
1½ "	.42	.52	.65
2 "	.48	.60	.75
2½ "	.54	.67	.84
2½ "	.60	.75	.94
3 "	.72	.90	1.12

EXTRA HEAVY STEAM, TANNERS' AND OIL HOSE.**3-PLY HOSE, BASED ON 20 LBS. FOR 1 INCH HOSE.**

Diam.	Per Foot.	Pressure, lbs.	Diam.	Per Foot.	Pressure, lbs.
½	\$0.30	40	1½	\$0.72	13
¾	.36	26	1½	.83	11½
1	.47	20	2	.94	10
1½	.60	16	2½	1.17	8

4-PLY HOSE, BASED ON 40 LBS. FOR 1 INCH HOSE.

Diam.	Per Foot.	Pressure, lbs.	Diam.	Per Foot.	Pressure, lbs.
½	\$0.36	80	1½	\$0.88	27
¾	.47	53	1½	1.02	23
1	.58	40	2	1.17	20
1½	.73	32	2½	1.46	16

5-PLY HOSE, BASED ON 60 LBS. FOR 1 INCH HOSE.

Diam.	Per Foot.	Pressure, lbs.	Diam.	Per Foot.	Pressure, lbs.
½		120	1½	\$1.10	40
¾		80	1½	1.27	34
1	\$0.71	60	2	1.45	30
1½	.91	48	2½	1.83	24

We are prepared to furnish Hose for special purposes, such as Air Brake, Gas, Acid, and Brewers' Hose. Also Suction Hose for Mining and Marine Pumps, Steam Fire Engines, etc.



FIG. 1365.

BOSTON
COTTON
MILL HOSE
RUBBER
LINED.

Size,	1	1½	1¾	2	2½	2¾
Per ft. \$	.38	.32	.35	.42	.46	.49

This is a reliable Hose for Mill use. Is light, strong and pliable, and will not sweat nor leak. Is guaranteed to 300 lbs. pressure.

The Boston Belting Co. manufacture a great variety of Fire Hose, Cotton and Linen covered, Woven, Knit or Twilled. For Pressures from 300 lbs. upwards. prices and description upon application.



FIG. 1366.

RUBBER
TUBING.

Diam.	½	¾	1	1¼	1½	1¾	2
Per ft. \$	.05	.07	.10	.12	.14	.16	.20

Sizes ½ and ¾ have walls ¼ thick; 1 to 1¾ thick; 1½ and 1¾ thick.

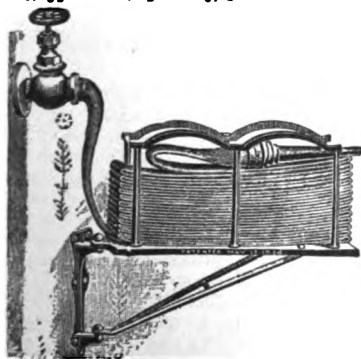


FIG. 1367. SWINGING HOSE RACK.

The Swinging Hose Racks are made in three styles, and in quite a variety of finishes. All parties interested in making their system for protection against fire as perfect as possible, should adopt the Swinging Hose Rack. It is a waste of money to buy Fire Hose and not have it in a condition that will enable them to use it at a moment's notice. With the Swinging Hose Rack one man can handle any length of Hose unaided.

We will send to any one desiring it, description and prices of these Hose Racks.



FIG. 1368. JENKINS' STANDARD PACKING.

The Jenkins' Packing has been over twenty years on the market, and is so well known, that it is hardly necessary for us to enlarge upon its merits. There are a great many worthless imitations of this Packing, and we caution users to accept nothing but the genuine Jenkins'. In comparing the price of this with others, we beg to call attention to the fact that the Jenkins' Packing weighs less than half of what some of the imitations do. ¼ thick weighs about 6 lbs. to the sq. yd., and other thicknesses in proportion.

This Packing can be made to any thickness desired. If one has only the thin Packing at hand, by placing two or more thicknesses together, and allowing the heat to come in contact with the Packing, and following up the joints, it will amalgamate and become solid.

We would ask, as a trial, that you use the Jenkins' Standard Packing in the worst joints you have; and if, after following directions, it is not what we claim, we will refund the money. Price, per lb., \$0.64.

We can furnish to order Gaskets of all shapes and sizes, made of Jenkins' Standard Packing. Price, per lb., \$0.85.



FIG. 1369.

RUBBER PACKING WITH CLOTH INSERTION.

Thick. 1-Ply. 2-Ply. 3-Ply. 4-Ply.

$\frac{1}{8}$ in.,	per lb.,	\$0.33	
$\frac{1}{4}$ "	"	\$0.33	
$\frac{3}{8}$ "	"	.29	
$\frac{1}{2}$ "	"	\$0.29	
$\frac{3}{4}$ "	"	.28	
1 "	"	\$0.28	



FIG. 1370.

ARROW BRAND BRAIDED FLAX PACKING.

This is manufactured from long fibre flax, and saturated with an excellent lubricant. This is used in the water-end of pumps, hydraulic elevators, etc., etc.

Price, per lb., \$0.40.

RED CROSS PISTON PACKING.

This Packing is similar to Empire and Eureka. We have it with either round or oval core. Price, per lb. \$0.35. FIG. 1371.



FIG. 1372.

SKULL AND BONES STEAM PISTON PACKING

This is a special quality of round core Piston Packing, lubricated entirely with the best quality of Dixon's Graphite, a brand of Packing intended to be the best that can be produced. Price, per lb., \$0.55.

FIG. 1371. RED CROSS PISTON PACKING. This Packing is similar to Empire and Eureka. We have it with either round or oval core. Price, per lb. \$0.35.

ALLEN'S SPIRAL SELF-LUBRICATING PACKING.

This is an excellent quality of Spiral Packing (similar to Garlock). The manufacturers guarantee it to do all the work that any Packing of this style will.

Price, per lb., \$0.80.

Can furnish, when required, Asbestos, wick and rope, Manhattan, Empire, Garlock, Soapstone, and Goodsell's Packings; also Italian and American hemp packing.

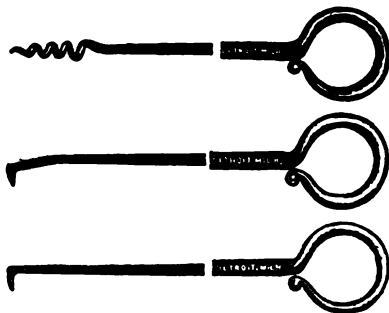


FIG. 1373. PACKING HOOKS.

These Packing Hooks will be found more than ordinarily useful. There are hundreds in use by engineers on the Lakes, and they need only to be seen to be appreciated. They are well made, of tool steel, and every engineer should have a set of them.

12 inches long,	set of 3,	\$0.75
15 "	" " " 3,	.90
18 "	" " " 3,	1.00

Postage, per set, 15 cents.



FIG. 1374. COTTON WASTE.

In Cotton Waste, we carry in stock both the White and Colored. We have but one quality, and that is the best.

Prices upon application.

RAW SILK MACHINE WIPERS.

The Raw Silk Towel has been on the market for six or eight years, and is in many establishments taking the place of Cotton Waste. It is claimed for them that they are not spontaneously combustible, and are superior for their softness, elasticity; and capability of easily absorbing greasy substances. We carry them in stock in two sizes, but can furnish a variety of other sizes.

No. 1, 13x15,	per doz.	\$1.00;	per gro.	\$10.00
" 4, 18x18,	"	1.90;	"	19.00

Sample, by mail, 12 cents.



FIG. 1375. HORSE SHOE MAGNET.

Size, In. 2	2½	3	4	5
Each, \$0.08	\$0.10	\$0.12	\$0.25	\$0.35
Size, In. 6	8	10	12	
Each, \$0.50	\$0.90	\$1.50	\$2.00	

We also have the round pointed Magnets that are used for removing small particles of iron or steel from the eye. Price, post-paid, 3½ inch, 35 cents; 7 inch, 60 cents.

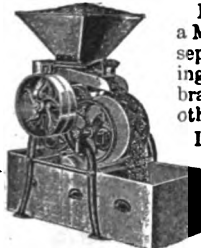
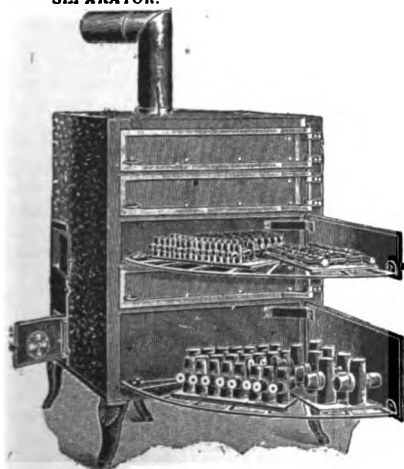
FIG. 1376.
MAGNETIC METAL
SEPARATOR.

Fig. 1376 represents a Magnetic Machine for separating iron turnings, filings, etc., from brass, composition and other metals.

It does the work most thoroughly, with little labor or trouble.

There are over 1200 of these Machines in use.

Price, \$135.00.

FIG. 1377.
MILLETT'S PATENT PORTABLE CORE OVEN.
(1905)

To meet a popular demand, the manufacturers of the Millett Patent Core Oven have brought out a Portable Oven, as shown in Fig 1377. The dimensions are as follows: 46 in. high, 36 in. wide, 36 in. deep, 9½ inch legs, fire-box 8½ inches square; front is of wrought and cast iron, sides and back of galvanized iron.

The cut shows the Oven with two doors open. There are four doors 5 in. high, and one door 10 in. high. Price, \$125.00.

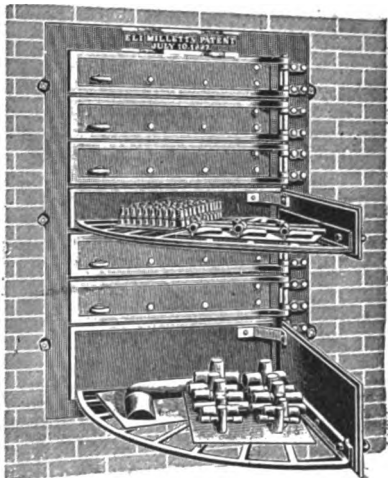


FIG. 1378. MILLETT'S CORE OVEN.

The Millett Core Oven has been on the market over six years, and is now in very general use by the leading foundries throughout the country. The Oven is made up of independent shelves, each having two doors, one in front and one behind, which closes the Oven when the shelf is swung out to put in or take out the cores.

A saving of fuel and heat is at once apparent, the result being that the cores are thoroughly baked, and in a much shorter time than by any other Oven.

The size represented in the cuts is, for general use, the most convenient. The lower door is 10 inches high; the others 5 inches high.

We are prepared to furnish the iron work complete for this and other sizes.

Circulars and prices sent upon application.

A POT OF GLUE.*

Many men use Glue all their lives and know but little of where it is made, or how. We will tell what we can, and that is not much after all—for it is an old saying, among both manufacturers and merchants, that the more you have to do with Glue, the less you think you know about it.

There are three leading kinds: First, Hide Glue, which is made of the hides or sinews of cattle and such beasts. The pieces of hide cut off by the butcher and tanner, which are of no use in making leather, are soaked in lime water a longer or shorter time, according to their condition. The lime eats away the fatty or partly decayed matter, leaving the glue substance uninjured, provided the process is not continued too long. This stock is then carefully washed and put into large kettles, where the glue liquor is readily boiled out and the insoluble fibre sinks to the bottom. The glue liquor is poured into pans, where it cools and hardens and is just such a substance as calves' foot jelly when served on the table. When cold, the jelly is turned out of the pans and sliced, and the sheets laid on nets and dried.

The second kind—Bone Glue—is made of the largest bones of cattle, and only differs from the other method in softening the stock by an acid, instead of a lime solution.

Sixty per cent of bone is lime, the other forty per cent (or thereabouts) is glue.

The third kind of glue is made from the feet of cattle and hogs; their hoofs contain a large proportion of glue matter, and this is simply washed and then boiled out.

As to which is best of the kinds mentioned, it is hard to decide between the first and second, the hide stock and the acid-treated bone stock glues. The greater purity and beauty belong most surely to the bone stock glue, and for work requiring delicacy as well as strength, it is unequalled. But the acid left in it, and which it is hard to wholly eradicate, qualifies its use for many purposes. In stiffening straw goods and finishing silks, and for very fine-grained and hard-surfaced wood work, it is admirable.

But, if we had no bone glue at all, we could get along very well. What would we do, however, if we had no glue made of hide stock? Thick flowing or thin flowing, dark color or light, slow settling or quick, rigid or elastic, it embraces them all. It is an old saying, "That glue is the poor workman's best friend"—that means hide stock glue, which is the cheapest because it is the best.

A great improvement was made twenty years ago, when this company first devised means of grinding glue and at nominal cost. Ground glue is now also extensively used throughout Europe. It is indeed not the poor workman's, but the good workman's best friend.

Now, a word as to the way to use glue. To begin with, glue is animal matter. A ham will keep a long time uncooked, but who would soak it over night and forget it the next day and expect to find the ham sweet; or would soak and cook it in a pot where other hams have been cooked and the pot never cleaned? Such treatment of glue is unworkmanlike and wasteful.

Then the glue maker knows when his glue is cooked enough, and that to cook it longer will hurt both its strength and its color; yet many users think that they can cook glue for hours and get as good, or even better results. They really ought to soak and cook ahead just what they require, and use it as fresh as possible. If the glue is ground (as it should be) they can soak it in three minutes, or dissolve more in the melted glue that is in the pot in one minute, and always have their melted glue at its best.

We now come to a source of much trouble. Glue will not hold unless the pieces to be glued are put together while the glue is still hot and liquid. Its function is to sink into the fibres and grasp them, which it cannot do when chilled. In the Autumn, when cooler weather makes glue dry more quickly, we have complaints that the glue will not hold. A suggestion to the above effect is usually sufficient. Again, take two woods; oak, which is close-grained, and pine, which is porous. One requires a thin-bodied and penetrating glue, to soak in and lay hold; the other needs a heavy-bodied glue, used thick, or the spongy wood will soak up the glue and leave nothing at all to hold with.

*For this article we are indebted to the Milligan & Higgins Glue Co.

CHEAP GLUES ARE NOT ECONOMICAL.

The quality of Glue is determined by the amount of water it will take, and glue is usually tested in this manner. Some of the cheap, common glues will not take the equivalent of their own weight in water.

The cheapest glue we handle (No. 5) will take 4 oz. of water to one. The No. 10, from 5 to 6 oz. of water to one, and the No. 15, from 8 to 10 oz. of water to one of glue.

The above extreme proportions would be modified by practice, as different kinds of work require the glue to be thinner or thicker, as the case may be.

It will, then, be readily understood that a pound of glue, costing 10 cents, and which will only make a quart of the prepared article, is more expensive than a glue, costing twice the amount, that will make two and one-half quarts, this leaving out consideration of the fact, that quantity for quantity, the higher-priced glue is much stronger and more durable, and in fact, more desirable in every way.

GROUND GLUE.*

In past years there has been among many users, a prejudice against Ground glue; and there is some foundation for this prejudice, as there are unscrupulous manufacturers who grind inferior glues as a means of hiding their defects. It is not easy to tell much about glue when ground, but it possesses several advantages over the sheet glue. It requires but a few minutes of soaking to dissolve, and for those who use glue occasionally, it is an easy matter to prepare just the amount needed and no more.

THE GLUES WE SELL**NO. 5 GLUE.**

This glue we keep to meet the demand for a low-priced article. It is of a fair quality, quite as good, or better, we think than most of the glue sold throughout the country at a much higher price. Our only excuse for keeping it is, that some people cannot be persuaded that high-grade glues are the cheapest in the long run.

*SHEET GLUE.—We can furnish any of these glues in sheet form when desired, at $\frac{1}{4}$ a cent per lb. less (this being the actual expense of grinding).

Price of Number 5 Glue, per lb., in small quantities, \$0.14; in 25 lb. lots, \$0.12.

NO. 10 GLUE.

This is a strong, sweet glue, suitable for cabinet-makers and general wood-work. It compares favorably with the better class of imported French and Irish glues. We sell more of this for general purposes than any of our glues; have sold it for the past ten years, and never have heard a single complaint.

Price, per lb., in small quantities, \$0.19; in 25 lb. lots, \$0.16.

NO. 15 GLUE.

This is the best glue we have. It is made of the choicest stock, and is, we believe, *as good a glue as can be produced*. We have customers who are using from one to two thousand pounds a month, men who have given a great deal of attention to the matter of glue, and who assure us that it is superior to anything they have ever used.

Price, per lb., in small quantities, \$0.25; in 25 lb. lots, \$0.22.

EMERY GLUE.

All first-class Glues answer very well for the purpose of fastening emery, and quartz, or flint, on wheels and belts, but for the best results in this class of work, the glue should possess two qualities. First, it must have great tenacity, so that the particles of emery or flint are held securely. Secondly, it must have flexibility. A glue may be very strong, and yet so hard, that it will crack or "peel", and allow the particles of emery to be thrown off.

As the time consumed in putting the emery on wheels and belts is usually worth many times the cost of the glue, it will be well to remember that a poor glue for this purpose is dear at any price.

Our Emery Glue is made especially for this work. We have it both in the sheet or cake, and ground form.

Price, per lb., in small quantities, \$0.25; in 25 lb. lots, \$0.22 per lb.

BELT GLUE OR CEMENT.

This is a glue made especially for the purpose of cementing leather belts.

Price, per lb., \$0.50.

LE PAGE'S LIQUID GLUE.



FIG. 1379.

These Fish Glues are applicable to all purposes for which Glue is employed, and are amongst the strongest adhesives known. The advantages of Le Page's liquid glues are found in the saving of labor, time, and fuel necessary for preparing ordinary glues. To secure the best results, it should be applied with a short, stiff brush, and rubbed off to a very thin coat.

We handle only genuine Le Page's glue made by the Russia Cement Co.

Gills,	each,	\$0.18;	per doz.	\$1.80
½ Pints,	"	.25;	"	2.55
Pints,	"	.40;	"	4.25
Quarts,	"	.70;	"	7.35
½ Gallons,	"	1.05;	"	11.50
Gallons,	"	1.90;	"	20.40



FIG. 1380.

MORANDI GLUE POT.

The Morandi Glue Pot is used with kerosene, does not smoke or smut, heats quickly, and will be found a great convenience.

No. 0,	\$1.00;	capacity,	1 pt.
" 1,	1.25;	"	1½ "
" 2,	1.50;	"	2 "
" 3,	1.75;	"	4 "

We can furnish this style Glue Pot for burning Gas. Prices and sizes same as kerosene Glue Pot.

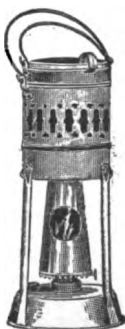


FIG. 1381.

STEAM GLUE HEATERS.

We present herewith, a very complete line of Steam Glue Heaters. Can furnish other sizes if desired; and can also furnish any of these styles without Stands, at prices from \$2.00 to \$3.00 less than list.

FIG. 1380.
PORCELAIN
LINED GLUE
POT.

No.	Each.	Capacity.
00	\$0.40	½ pts.
0	.45	1 "
1	.55	1½ "
2	.65	2 "
3	.75	2½ "
4	.90	4 "
5	1.10	4½ "
6	1.30	5 "

FIG. 1382. NO. 3 GLUE HEATER.

No. 2, \$13.50; has 8 Enamelled Pots, holding ½ gal. each.

No. 3 (see cut), \$17.00; has 5 Enamelled Pots, holding ½ gal. each, and one 1½ gal. Pot.

No. 9, \$20.00; has 3 Enamelled Pots, holding 3 gal. each.

No. 10, \$10.00; has 1 Enamelled Pot, holding ½ gal.

No. 11, \$31.00; has 2 Enamelled Pots, holding 1½ gal. each, and 8 Pots, holding ½ gal. each.

No. 12, \$15.00; has 3 Enamelled Pots, holding ½ gal. each; or (if preferred) three ½ gal. Pots, with Outside Jackets, as shown in Fig. 1380.

No. 16, \$38.00; has one 2 gal. Pot, and five ½ gal. Pots, or (if preferred) one 9 gal. Pot and five ½ gal. Pots with Outside Jackets, as shown in Fig. 1380.

No. 17, \$26.00; has 16 Enamelled Pots, holding ½ gal. each.

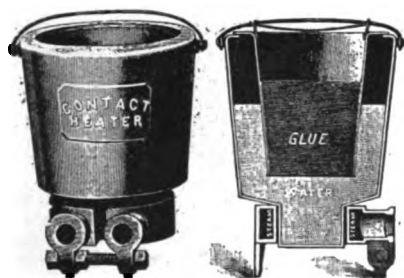


FIG. 1383. CONTACT GLUE HEATER.

These Heaters are used very largely by Piano, Organ and Furniture manufacturers, some manufacturers having upwards of 100 in use. They require but one line of Pipe and only 2 Valves to a section of several Heaters. They can be adjusted to maintain any desired temperature. The adjustment is accomplished without the use of valves, by bringing the hot steam-heated surface and the surface to be heated, more or less in contact, which is done by closing or opening the steam-ring, by means of the screw.

Price, with Copper. Glue Pot, $\frac{1}{4}$ gallon, \$4.50.



FIG. 1384. GLUE BOILER.

No. 4 $\frac{1}{2}$, \$22.00; capacity, 5 gallons.
 No. 5 $\frac{1}{2}$, 30.00; " 10 "
 No. 7, 39.00; " 16 "

IN ORDERING, always give Figure Number and Size wanted.

CLOCKS



FIG. 1385. WORLD.

The Clocks we illustrate here are such as we use in our own works. They are of the Seth Thomas make, and can be depended upon as time-keepers. We can furnish them finished in different woods, light or dark, as may be desired.

We use the "World" as an office clock the "Regulator" in the engine-room



FIG. 1386. REGULATOR.

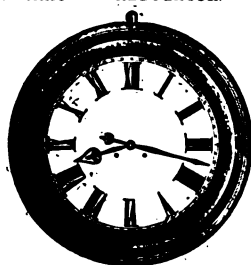


FIG. 1387. GALLERY.

(from where the starting and shutting down bell is rung), and the "Gallery" Clocks in the shops, on account of the large size of face, which enables the men working at a distance to keep their time, without going to the other end of shop.

Can furnish any style of clock desired, but don't like to sell cheap clocks. A clock is an article that lasts so long, and upon which so much depends, that it is misplaced economy to buy a poor one.

World, \$9.45; 15 Day, has 12 inch dial, height over all 32 inches.

Regulator, \$25.65; 8 Day, has 14 inch dial, height over all 54 inches.

Gallery, 18 inch, \$21.60; 24 inch, \$29.70; 15 Day

WATCHMAN'S CLOCKS.

A watchman is employed to protect one against theft and fire, and, incidentally, to impart a sense of security to owners of property. If the watchman is lazy, careless, or (as is sometimes the case), worse, the Watchman's Clock will expose him. If, on the other hand, he is faithful, the Clock will serve but to confirm his reliability.

The Clocks shown here serve a double purpose, of a watch upon the watchman, and a timepiece.

REGULATOR NO. 1.

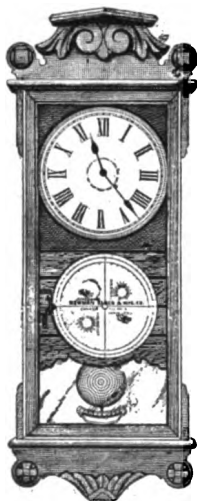


FIG. 1388.

The Record Dial is forty-eight hour, and needs to be removed every other day only. Price, \$15.00, with a year's supply of dials.

Regulator No. 2 is operated in the same manner as No. 1. The Watchman's Dial makes a revolution only once in seven days, so that it needs attention but once a week. Price, \$18.00, complete with one year's supply of dials. The cases of these clocks are of dark oak, nicely finished.

PORTABLE WATCHMAN'S TIME DETECTOR.

Price, with Pouch, Dials, and 6 different keys for 6 different stations complete, \$49.50; with 12 keys for 12 stations, \$52.50.



FIG. 1389.

These Clocks cannot be tampered with. They are simple, and there is nothing to get out of order more than in an ordinary clock. They are very reasonable in price, which is quite a consideration, especially where a large number of stations are necessary.

Regulator No. 1, as shown in cut, is operated by a single movement, running eight days. Length of case, 34 inches; width, 12 inches; dial, 8 inches.

The Record Dial



FIG. 1390.

THE AMERICAN WATCHMAN'S TIME DETECTOR.

This is designed to keep an exact record of the doings of the night watchman in any establishment where it is in use. The Instrument is placed in the office, and is connected by insulated electric wires, to key-stations placed in different parts of the premises where the watchmen are required to pass. As the watchman passes on his rounds, he operates each station in turn, and this is instantly recorded in the Detector in the office, showing where each watchman is, and when he is at each station. It makes no difference how many watchmen are employed, there is a separate record for each, and one watchman cannot make a record for the others without its being recorded on the dial.

These instruments can be furnished in various styles, and we will mail catalogue upon application.

TIME REGISTERS.

It is but a few years since the Time Register, or Recorder, was brought out. Although at first intended more especially for keeping account of time in large manufacturing establishments, its value is coming to be appreciated more and more, in the smaller shops, stores, and mercantile establishments.

No one would think of questioning the necessity of keeping time in manufacturing establishments, and we know of no reason why any concern that employs even as few as a dozen people, should not keep the time of their coming and going.

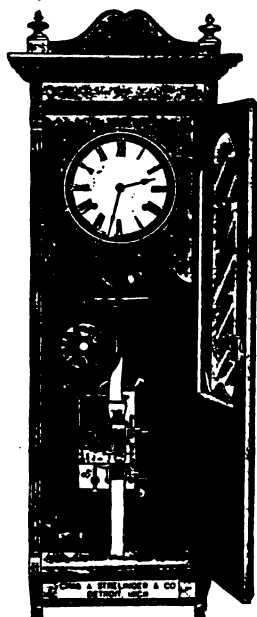


FIG. 1391 REGISTER.

27	6:55
73	5:55
100	7:00
46	7:05
3	8:00
73	12:00
46	12:00
3	12:00
27	12:05
100	12:15
73	1:00
27	1:00
100	1:05
46	1:10

Fac-simile of Record Slip, showing arrival in the morning, departure at noon, and return in the afternoon.



FIG. 1392. KEY.

The Clock and Register are locked in the case, leaving an opening for the operator's key. A single push of the key makes a permanent printed record of the number of the employee, and the time of

arrival or departure, in neat, legible type upon a paper slip, as shown in cut.

The Register serves as a check against indolence and carelessness, and gives an indisputable record of the time of coming in and going out.

A Loss of Time is a Loss of Cash. The Automatic Time Register stands in the same relation to the employer and employee that the scales, rule and tape measure do between dealers in other commodities.

It fears none, has no favorites, makes no mistakes in booking time, and prevents all petty strife, jealousy and dispute between time-keeper and workmen. It draws no salary, shows up the laggard, and pays for itself many times over in time saved.

Price of Register, with Clock and Battery complete, also 50 Keys and Keyboard Case, \$100.00.

AUXILIARY REGISTER.

Operated by electricity, designed for use by large concerns where, by reason of a large number of employees in distantly located departments, it is undesirable to have all register at the same place. Any number of these Auxiliaries can be placed at different points, and controlled by one clock, located in the office or other suitable place, thus making one uniform time throughout the establishment, and saving the cost, winding and repairing of a clock for each department.

With these Time Registers, used in connection with Auxiliary Registers, there is no limit to the number of persons that can be registered.

A large manufacturing establishment in Pittsburgh, is using one of these Registers with 6 Auxiliaries, keeping account of the time of 1470 employees.

Auxiliary Registers, including 50 Keys and Keyboard Case, \$50.00.

Additional Keys, \$0.25 each.

NO NAME FOLKS.—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name. If it is an order from him with money enclosed, we are pretty sure to hear from him, wanting to know where the goods are—and sometimes the letters are not overly civil; if it is a letter of inquiry and our correspondent gets no answer, he thinks we are inattentive or careless, and as a result, we are apt to lose what might be a good customer.

FIRE! FIRE!! FIRE!!!

Appliances for fighting fire are coming to be considered a necessity in manufacturing establishments, as well as public buildings and institutions. It is singular how indifferent most people are regarding fire protection, until their attention is forcibly directed to the matter by fires in their vicinity or on their own premises.

There are many concerns who pay out yearly, hundreds and even thousands of dollars for insurance, and yet with gross indifference or neglect, depend upon a few wooden pails (usually empty or falling to pieces) as their sole protection against fire. (We speak knowingly, because we have been there).

Less than a month ago, a large mercantile establishment, located within 200 yards of our premises, took fire at mid-day, and burned completely out. Seven lives were lost, and \$500,000 worth of property destroyed. We believe that one or two Fire Extinguishers used at the start, would have prevented the spreading of this fire.

OILY WASTE CANS.

It is a well known fact that cotton waste saturated with oil will ignite spontaneously, under certain conditions when exposed to the air. Many disastrous fires can be traced to this cause, and no doubt a goodly proportion of "mysterious" fires are the result of the careless

1393. WASTE CAN. disposal of oily waste.

The Oily Waste Can, shown in above cut, has self-closing cover, with improved spring attachment. These Cans are made without the use of solder, and are galvanized after being put together. We carry in stock one size, which is 11x14 inches in diameter, and 15 inches high. Price, each, \$1.40; per doz., \$15.00.

We can furnish to order a variety of other sizes, from 12 to 24 inches in diam. and 18 to 36 inches in height, also rectangular cans. Sizes and prices will be given upon application.

There are lots of GOOD THINGS in the market that are not shown in this book. Some of them we can tell you about, if you will write us.

FIRE EXTINGUISHERS.

FIG. 1394. BABCOCK.

buildings, has a capacity of 6 gallons.

Price, each, \$35.00.

The "Pony" size holds 3 gallons; price \$25.00.

Each Extinguisher is furnished with 6 charges of chemicals, and full directions are placed upon it, showing how to use the machine in case of fire.

The Handy Automatic Fire Extinguisher has only been on the market for about two years, but has in this short time been very thoroughly introduced. It is very simple in construction; anyone can handle it. The only instructions required to operate it are, that you simply "pick it up", the handle being pivoted below the center of gravity, the cylinder turns upside down; the bottle holding the acid is opened, and instantly changes the machine from a simple three-gallon tank of water to a powerful Fire Extinguisher, capable of throwing a stream a distance of 40 ft.

This is made in one size only, capacity 3 gals. Price, each, \$14.00.

The Babcock Fire Extinguisher, which we illustrate here, is too well known to require an extended description. It is claimed that each gallon of their contents will extinguish as much fire as 40 times its own bulk of water.

Furnished in two sizes; the regular size, most commonly used about manufacturing establishments and public



1395. HANDLY.



FIG. 1396. FIREMAN'S AXE.
Each, \$2.00; per doz., \$21.00.



FIG. 1397. GALVANIZED FIRE BUCKET.
The Round Bottom bucket is coming

into very general use for purposes of fire protection. The common style of bucket is very apt to be taken from its place to be used for ordinary purposes, and when most needed, is apt to be either empty or somewhere else. The Round Bottom bucket is hung up, and cannot very well be used for any other purpose than that for which it is intended.

PLAIN BUCKETS.			ROUND BOTTOM.		
Size.	Each.	Per doz.	Size.	Each.	Per doz.
12 qt.	\$0.38	\$3.75	12 qt.	\$0.50	\$5.00
14 "	.40	4.00	14 "	.55	5.50

Covers for Fire Buckets, each, \$0.18; per doz., \$1.75.

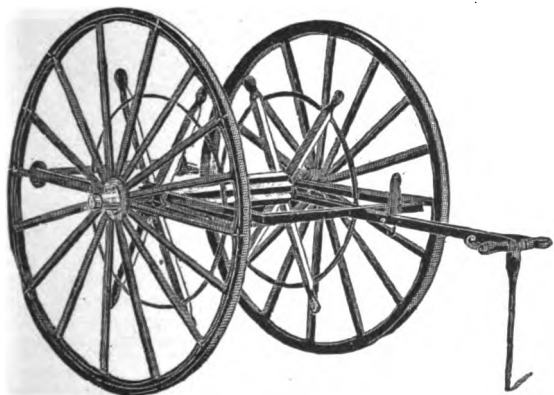
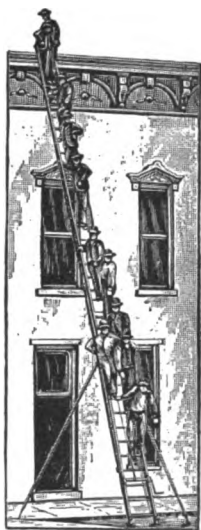


FIG. 1398. WAREHOUSE REEL.

Number. Price. Diam. Wheel. Width.

00	\$12.00	30 in.	34 in.	Holds 200 ft. $\frac{1}{2}$ inch hose.
0	25.00	42 "	50 "	" 200 " $2\frac{1}{4}$ " "
2	35.00	48 "	52 "	" 300 " $2\frac{1}{4}$ " "
3	45.00	56 "	54 "	" 500 " $2\frac{1}{4}$ " "



1400. TRUSSED LADDER.

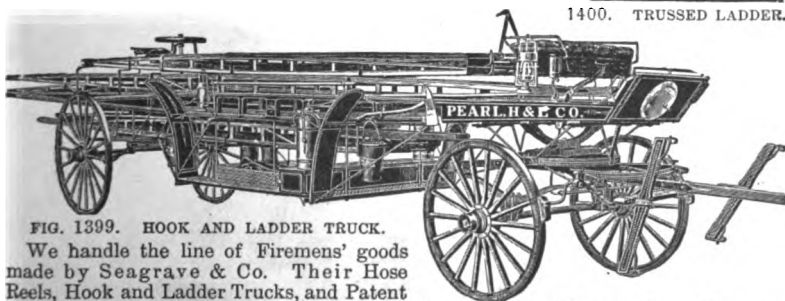


FIG. 1399. HOOK AND LADDER TRUCK.

We handle the line of Firemen's goods made by Seagrave & Co. Their Hose Reels, Hook and Ladder Trucks, and Patent Trussed, Plain and Extension Ladders (for fire, painters' and general use) have no superiors. Detailed information upon application.



FIG. 1401

FIG. 1402.

STORE OR WAREHOUSE HANDY TRUCK.
TRUCK—HALF-IRONED.

The "Handy" Truck, Fig. 1402, is strong, well made, and very reasonable in price. Made in but one size, 46 inches long; upper bar 17 inches wide, lower bar 12 inches wide. Price, each, \$2 25.

PRICE LIST STORE TRUCKS.

No.	Half Ironed.	Full Ironed.	Width.	Length
1	\$3.00	\$3.45	19	47
2	4.25	4.75	20	52
3	5.40	6.00	22	56
4		8.40	24	60

HOTEL TRUCKS

These Trucks are the same in style as shown in Fig. 1402, but have heavy rubber tires on the wheels, preventing the noise. Are especially adapted for Hotels, Carpet and Glassware Houses. No. 1, \$5.25; No. 2, \$7.25

We carry in stock and can furnish Steamboat, Barrel and Railroad Trucks, all sizes and styles.



FIG. 1403. SKIDS.

The 6 and 7 ft. Skids have two iron cross bars, other sizes three

Lgth.	6	7	8	9	10	12 ft.
Each,	\$2.65	3.00	3.75	4.50	5.25	6.50

FIG. 1404 SHIPPING TRUCK.

Price, \$12.00.



For general use in shipping and packing room, warehouses, etc. Platform 30x50 in., made of hard maple. Large wheels, 16 in. diameter, on 1 1/2 inch axle. Small wheels 6 inches diameter.



FIG. 1405. BOX TRUCK.

No. 0, \$6.00; platform 20x25, 20 in deep
No. 00, 7.00. " 24x36, 20 " "

Designed for use in factories or stores, in handling small pieces, packages, etc. Adapted also for shavings and sweepings. The rigid wheels are 5 inches in diam.; casters, 4 inches

FIG. 1406

WAREHOUSE TRUCK

No. A, \$6.00, 24x36,
7 1/2 inches high.

No. B, \$8.00, 30x48,
8 1/2 inches high.

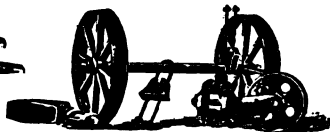


FIG. 1407. TRUCK IRONS.

We sell these Truck Irons largely to concerns who are in a position to furnish

the woodwork themselves. The prices are for the Irons only, all complete ready for the wood-work. Trucks can be made of any length or width desired. The Axles are of 1 inch steel, and 28½ inches long, unless otherwise ordered.

Number.	Per Set.	Main Wheels.	Cent. Wheels
1	\$4.25	10 x 2½	5 x 2
2	4.50	10 x 3	5 x 3
3	5.00	16 x 2½	8 x 2

We can furnish Stake Irons when desired, at \$0.50 per set of 4.

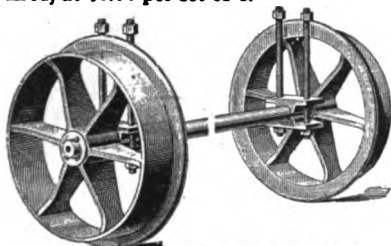


FIG. 1408. LUMBER TRUCK WHEELS.

These Wheels are very strong. The price list includes 4 Wheels, 2 Axles, 4 Boxes, and 8 Bolts for 10 inch timbers. The wheels run loose on axle, and are in position by the boxes on inside, and the washers and cotter-pin on the outside of wheel. Prices are based on 3 ft. gauge track. When ordering, give distance between track.

Diam. Wheel, 12	14	16
Diam. Axle, 1½	1½	1½
Price, \$13.50	16.00	18.50
Diam. Wheel, 18	20	24
Diam. Axle, 1½	1½	1½
Price, \$21.00	24.00	27.50

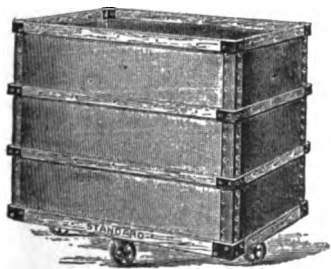


FIG. 1409. FIBRE ORDER TRUCK.

These Cars are used largely by manufacturers and wholesale dealers in getting out country orders.

The bodies are made of dark red fibre, and the bands of hardwood. The sizes given here are the most commonly used. We can furnish other sizes when desired.

Number.	Price each.	Length.	Width.	Depth.
A	\$9.50	32	22	24
C	10.00	36	24	24
E	10.50	36	24	24
G	11.00	38	26	24
L	12.00	40	28	30



FIG. 1410.
FACTORY TRUCK
Price, \$7.00.

This is the standard truck for general factory use. Frame and stakes made of dry maple, well joint-bolted together. Castings are strong, large wheels have solid shaft full width of truck. Wheels revolve on shaft, allowing truck to be turned in its own length. Large wheels 14 in. diam., 2½ in. face. Casters 6 in. diam., 1½ in. face. Platform, 25x48 in.

No. 20 Factory Truck, \$7.50. Similar to No. 2, but with Iron Corner Pockets, in which removable stakes are used.

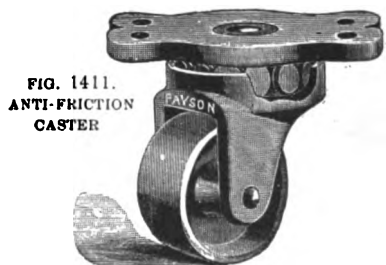


FIG. 1411.
ANTI-FRICTION
CASTER

The Caster revolves on steel rollers, or discs, and relieves all friction upon the pivot or strain upon the fastening screw. Easy in action, strong, and durable.

We price here the style shown in cut, with iron wheel. We can furnish all

sizes up to 2 inch, with round plate, and with lignumvitas or brass wheels.

Number	Set of 4.	Size Wheel.	Size Plate.	Working Capacity.
182	\$0.23	1½	1½	60 lbs.
183	.33	1½	1½	125 "
184	.43	1½	1½	300 "
186	.55	2	2½	500 "

TRUCK CASTERS.

Number.	Set of 4.	Size Wheel.	Work. Cap.
168	\$1.20	2½	1200 lbs.
190	1.50	3½	1800 "
192	5.00	4	3000 "
195	12.50	6	6000 "

YALE CASTERS.

We can furnish the Double-Wheel Yale Casters, in a variety of sizes, with wheels from 1 to 5 in. Prices upon application.

STEEL AND BRASS BALLS.

The use of Balls in machinery and other places to reduce friction, is as yet in its infancy, but when the proper application is better understood by designers, the number of places that will suggest themselves are legion.



FIG. 1412. HARDENED STEEL BALLS.

These Balls are made from fine quality tool steel, hardened and ground, and do not vary more than $\frac{1}{1000}$ of an inch from the given size. The smaller sizes (up to $\frac{1}{4}$ inch) are special Bicycle sizes. Of these sizes any number up to 100 can be sent by mail for 5 cents, postage.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Per 100,	\$1.00	1.00	1.00	1.00	1.20	1.50
Per Doz.,	.15	.15	.15	.15	.20	.25
Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1½	2	2½
Per 100,	\$3.00	3.40	4.00	5.20	8.00	11.20
Per Doz.,	.45	.50	.60	.80	1.20	1.65

We can furnish intermediate sizes, also larger sizes up to 3 inches in diam.

BRASS BALLS.

These are used in Ball Check Valves, and for many other purposes.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	1	1½
Each,	\$0.40	.43	.50	.67
Size,	1½	2	2½	3
Each,	\$1.00	1.85	3.00	3.50
Size,	3	3½	4	5
Each,	\$4.00	4.65	6.00	8.75

STEEL BARROWS.

Steel Barrows are coming into very general use. They combine great strength and durability, with comparative lightness. For many kinds of work, a Steel Barrow will outwear six wooden ones; they are now furnished at much lower prices than formerly.



FIG. 1413. STYLE A.

The tray is pressed from a single piece of steel, and is so shaped and placed upon the frame as to bring the greater part of the load over the wheel.

A-1, \$5.25, tray of 16 gauge steel; capacity, 3 cubic ft.; weight, 70 lbs.; wheel, 17 inch diam.; tire, $1\frac{1}{2} \times \frac{1}{4}$; spokes, $\frac{1}{4}$ in.; axle, $\frac{1}{2}$. For moving ashes, earth, etc.

A-3, \$6.50, tray of 12 gauge steel; capacity, 3 cubic ft.; weight, 70 lbs.; wheel, 17 inches diam.; tire, $1\frac{1}{2} \times \frac{1}{4}$; spoke, $\frac{1}{4}$ in.; axle, $\frac{1}{2}$. For machine shops, foundries, furnaces, rolling mills, etc.

B-1, \$5.75. This is the same as No. A-1, excepting that the tray is larger, and has a capacity of 5 cubic ft.

B-3, \$7.00. Same as A-3, excepting that tray has a capacity of 5 cub. ft.



FIG. 1414. SQUARE TRAY BARROW. This style of Barrow is desirable for

handling coal, ashes, etc. It dumps over the end, without running back on the operator

No. 0, \$12.75, trays made of No. 12 gauge steel, well lapped at the corners, and has a rim riveted around the top. Length of tray, 42 inches; width, 33 inches; capacity, about 5 bushels of coal.

TWO-WHEEL BARROWS.

Same general style as Fig. 1414, but with two wheels. Used for handling coal, ashes, and charging furnaces; is also useful for handling castings.

No. 1, \$21.50; length of tray, 44 inches; width, 36 inches; wheels, 20 inches diam.; axle, 1 inch; capacity, 6 bushels of coal.

No. 2, \$29.00; length of tray, 48 inches; width, 40 inches; axle, 1½ inch; capacity, 8 bushels of coal.

OTHER STYLES.

We carry in stock, and can furnish, a great many other styles of Barrows, such as Contractors', Wood Frame Steel Tray, Pig Iron, Furnace Charging, Brick, etc.

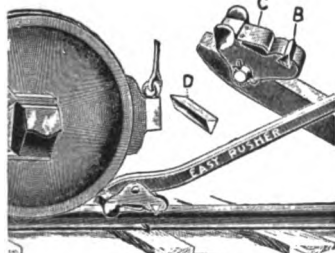


FIG. 1415. THE "EASY" CAR PUSHER.

This is a most convenient device for moving cars on switches and sidings; it weighs but 20 lbs., and is easily handled. Will work on any track: rough, greasy, icy, or wet rails do not effect its operation. Price, each, \$5.00.



FIG. 1416. POSTAL SCALE.

No. 601, \$2.70; capacity, ½ to 8 oz.
No. 613, 3.60; " ¼ to 16, oz.
No. 606, 10.80; " ½ oz. to 6 lbs.
(double beam.)

FIG. 1417.

PLATFORM SCALE.

600 lb. Scale, \$14.00

1200 lb. Scale, 18.00

These Platform Scales are equal in quality to any we know of. We will guarantee them as regards accuracy and wearing quality.



The wood work is of hardwood, finished in the natural grain, and they are handsome goods. Besides this, they are very reasonable in price.

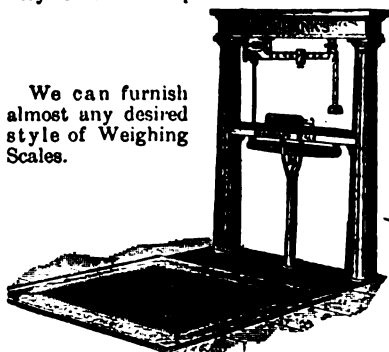


FIG. 1418 DORMANT WAREHOUSE SCALE.



FIG. 1419. WATER COOLER. This Water Cooler is intended for offices and shops. It is made of two thicknesses of wood, lined with a heavy galvanized iron tank; in the center of tank is a galvanized iron ice receptacle, thus keeping the drinking water separate from the melted ice.

No.	Each.	Diam.	Height.	Tot. Capac'y.
1	\$7.00	13 in.	19 in.	6 gals.
2	7.50	14½ "	21½ "	8 "
3	10.00	17 "	25 "	13 "
4	20.00	21 "	32 "	30 "

GAS FURNACES AND BURNERS.

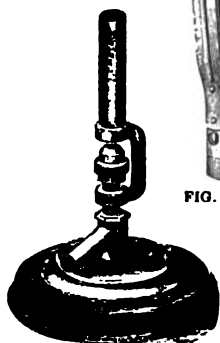


FIG. 1420.

The Adjustable Bunsen Burner, Fig. 1420, is especially adapted for burning gas of variable quality; is strong and well made. Total height $6\frac{1}{2}$ inches.

No. 5-G, \$1.25; on iron base.

No. 5-H, \$2.25; on brass base, turned and polished.

The Brown & Sharpe Burner, Fig. 1421, is used for tempering small tools. Price, \$0.75.

Fig. 1422, represents the ordinary Brass Tube Bunsen, with Fletcher's Quieting Jet (without stand); all have Air Slides.

Number.	Price.	Diam. of Tube.	Height inches.
3-FB	\$0.35	without Stand	$3\frac{1}{2}$
6-FB	.45	"	5
12-FB	.75	"	7
3-FBM	.85	with Brass	$4\frac{1}{2}$
6-FBM	1.10	"	6
12-FBM	1.75	"	8

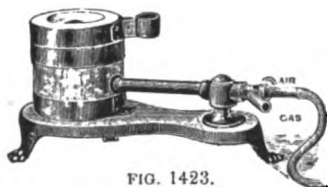


FIG. 1423.

GAS CRUCIBLE FURNACE, NO. 40-A.

The Gas Crucible Furnace, Fig. 1423, takes crucible 2 inches in diameter by $2\frac{1}{2}$



FIG. 1421.

FIG. 1422.

inches high. Use $\frac{1}{2}$ inch tubing, and No 9-A or No. 10-A Foot Blower, with this furnace.

No. 40-A, \$3.50, without blower or rubber tube.

FIG. 1424.
GAS CRUCIBLE FURNACE
NO. 41.



Takes crucible $2\frac{1}{2}$ inches diameter by 3 inches high. Uses same size tubing and foot blower as No. 40-A.

No. 41, \$4.50; without blower or rubber tube.

No. 41-A, \$7.00; without blower or rubber tube.

The No. 41-A takes crucible $3\frac{1}{2}$ inches in diameter by 4 inches high. Use $\frac{1}{2}$ inch tubing, and No. 9-B or No. 10-B Foot Blower.

No. 40-B, \$4.50. Kerosene Crucible Furnace; same capacity as No. 40-A.

CRUCIBLES FOR ABOVE FURNACES.

No.	Each.	Diameter.	Height.	Capacity.
00	\$0.25	2 in.	$2\frac{1}{2}$ in.	$\frac{1}{2}$ lbs.
1	.35	$2\frac{1}{2}$ "	3 "	1 "
3	.40	$3\frac{1}{2}$ "	4 "	6 "

FOOT BLOWER WITH LEGS.



FIG. 1425.

	Without Legs
No. 9,	\$4.00
" 9,	5.00
" 9,	7.00
	With Legs
No. 10,	\$5.00
" 10-A,	6.00
" 10-B,	8.00

BLOW PIPES.



FIG. 1426. NO. 30, TAPER. \$0.75 each.



FIG. 1427. NO. 30-A, STRAIGHT. \$0.65 ea.

The Fletcher Hot Blast Blow Pipe has nearly double the power of the old style.

ORDINARY MOUTH BLOW PIPES.

9 inch, 15c; 10 inch, 20c; 12 inch, 35c each.

The Brazing Blow Pipe is extensively used by machinists, tool-makers and bicycle manufacturers and repairers, for annealing, heating tools for hardening, and brazing articles that require great heating power. They are quick in their operation, convenient, and more economical than a forge. For tool-room purposes they are unexcelled. Made in four styles and three sizes. The stop-cocks are both under perfect control of the thumb of the hand holding the blow-pipe.

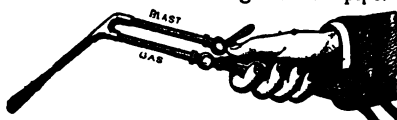


FIG. 1428. NO. 8-C.

No. 8-C, \$2.25, see Fig. 1428; $\frac{1}{4}$ inch air jet, $\frac{1}{8}$ inch gas opening, with stop-cocks. Requires $\frac{1}{8}$ inch gas supply pipe and tap.

No. 8-B, \$1.75; same dimension as No. 8-C, but without stop-cocks.

Nos. 8-B and 8-C require No. 9-A or No. 10-A Foot Blower.

No. 8-E, \$4.25; $\frac{1}{4}$ inch air jet, $\frac{1}{4}$ inch gas opening, with stop-cocks. Requires $\frac{1}{4}$ inch gas supply pipe and tap.

No. 8-F, \$6.00; $\frac{1}{4}$ inch air jet, 1 inch gas opening with stop cocks. New pattern for large work. Requires $\frac{1}{4}$ inch gas supply pipe and tap.

Nos. 8-E and 8-F require No. 9-B or No. 10-B Foot Blower.

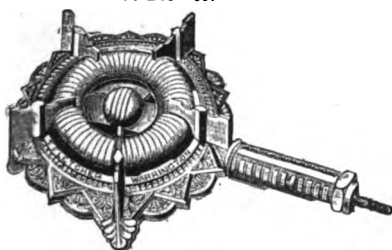


FIG. 1429. RADIAL BURNER.

This is the most perfect burner for general use ever constructed.

Useful for tempering tools, heating liquids, glue, etc. The flames are practically solid when in use. A very powerful heater and cleanly.

No. 1-R, \$1.75; with $3\frac{1}{4}$ inch burner ring.
No. 2-R, \$2.25; with 5 " " "

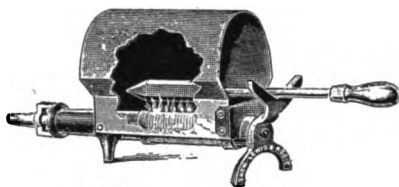


FIG. 1430. SOLDERING IRON HEATER.

For heating Soldering Coppers for tinner, plumbers, electrotypers, etc. This heater has been on the market for a number of years, and has done much to bring the merits of gas into notice as an aid in the workshop.

No. 18, \$2.00 (see Fig. 1430).

No. 18-A, \$4.00 (not illustrated). This Heater is larger and of greater capacity than No. 18, has a flat top with griddle holder, can be used for melting solder, etc.

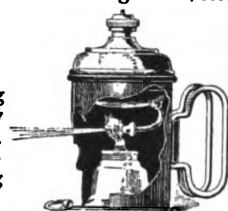


FIG. 1431.

The Self-acting Alcohol Blow Lamp, Fig. 1431, is used for soldering or brazing small articles.

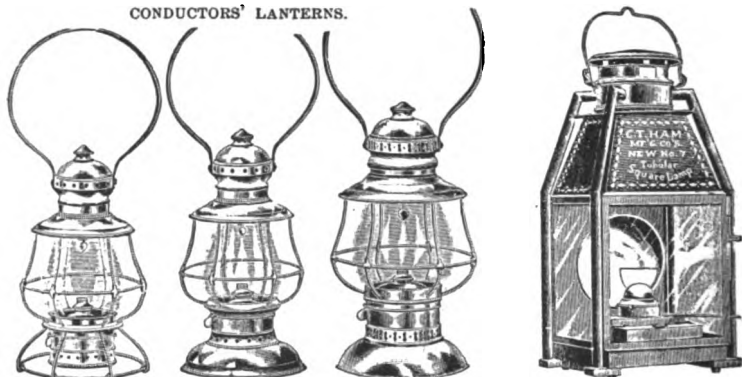
No. 2, \$1.75; diam. 3 in.; height, $5\frac{1}{4}$ in.
" 4, 2.50; " $3\frac{1}{2}$ " " $6\frac{3}{4}$ "

OUR GUARANTEE.—What we mean by warranting tools is, that if tools are not of first quality and as represented in every particular, they may be returned to us and we will replace them at our own expense, or if desired, will refund the price paid. We ask, however, that we be notified always before tools are sent back.

It can be seen by the above guarantee that we have every confidence in the quality of our tools.

INQUIRIES.—We have endeavored throughout this book, to answer a great many of the inquiries commonly received by us, but we wish it understood that we are at the service of our patrons and will cheerfully give any information that lies in our power to obtain. In this connection, we wish to say, that questions asked by our customers are sometimes overlooked. We do not mean to be careless, and if any inquiries are not answered, we kindly ask that they be repeated.

CONDUCTORS' LANTERNS.



1432. NO. 90. 1433. PULLMAN. 1434. NO. 95. 1437. TUBULAR SQUARE LAMP.

No. 90, Brass, \$4.00; Nickel-plated, \$4.80. Pullman, Brass, \$4.00; Nickel-plated, \$4.80. No. 95, Brass, \$2.50; Nickel-plated, \$3.25.

We can furnish any of these Lanterns with green, blue, or red globes, or one-half green, blue, or red, when desired.

These lamps give a very bright light, and will not smoke or blow out in the strongest wind. They are especially adapted for use in warehouses, saw-mills, railroad stations, etc. etc. They have silvered glass reflectors and outside wick regulator.

No. 116, \$3.50, 1 inch wick, 6 inch reflector; No. 117, \$4.90, 1½ inch wick, 8 inch reflector; No. 115, \$6.35, 1½ inch wick, 12 inch reflector.

The No. 116 measures 17; the No. 117, 22½; the No. 115, 24½ inches in height, other dimensions in proportion.

TUBULAR HANGING LAMP.

(Not illustrated).

No. 113, \$3.50 each, has 1 inch wick; No. 111, \$4.15 each, has 1½ inch wick.

DARK LANTERNS.

These are the Police or Watchmens' Dark Lanterns; finely finished and strong; parts all riveted together, and the glasses are of the best quality fire-polished.

The Tin Lanterns are nickel-plated, and the Brass highly polished.

No. 730,	\$1.20,	2½	inch	lens,	Tin,	N. P.
No. 740,	1.50,	3	"	"	"	"
No. 70,	2.25,	2	"	"	Brass.	
No. 72,	2.50,	2½	"	"	"	
No. 74,	3.25,	3	"	"	"	



FIG. 1435.

R. R. LANTERN.

No. 43, ea. \$0.75

per doz., \$7.50.

FIG. 1436. TUBULAR.

Fig. 1436 represents the Tubular Side Reflector Lamps. These Lamps are especially adapted for use in stores, warehouses, barns, engine and boiler rooms, or any place where a strong light is required. They have silvered glass reflectors, and are finished in blue japanned.

No. 71, each \$1.00; per dozen, \$11.00; has 5 inch reflector, and ½ inch wick.

No. 72, each \$1.35; per dozen, \$14.00; has 6 inch reflector, and 1 inch wick.



FIG. 1438.

The Tin Lanterns are nickel-plated, and the Brass highly polished.

No. 730,	\$1.20,	2½	inch	lens,	Tin,	N. P.
No. 740,	1.50,	3	"	"	"	"
No. 70,	2.25,	2	"	"	Brass.	
No. 72,	2.50,	2½	"	"	"	
No. 74,	3.25,	3	"	"	"	

DO NOT Cut or Tear the pages of this catalogue, as that destroys the book for future reference.

METAL POLISH.

We have in the past sold a great many kinds of Metal Polish, including different brands of Putz-Pomade. We believe the Matchless Polish is very much superior to the majority of Polishes, and is excelled by no other.



FIG. 1439.

The Matchless Metal Polish is a creamy white paste especially adapted to cleaning and polishing fine metal goods.

3 oz. boxes, each, \$0.10; per doz., \$0.75
1 lb. " " .40; " 3.50

Tripoline Metal Polish is manufactured especially for cleaning and burnishing railroad, marine and stationary engine work, large signs, railings, etc., and is a rapid and powerful cleanser and preserver of metals.

3 oz. boxes, each, \$0.10; per doz., \$0.75
1 lb. " " .35; " 3.00



FIG. 1440. METAL-WORKERS' CRAYON.

This is made of pure soap-stone, and is by far the best article for marking on metals. It will not burn off.

Size, $\frac{1}{4} \times \frac{1}{4}$ in., price, per doz., \$0.25; per gross, \$2.50. Round Pencils, $\frac{1}{4} \times 5$ in., per doz., \$0.20; per gross, \$1.50; sample, by mail, \$0.05.



FIG. 1441. LUMBER CRAYON.

Although intended originally for marking lumber, these Crayons can be used for all sorts of purposes, and are superior in every respect.

Black, each, \$0.06; doz., \$0.60, gro. \$6.00
Red or Blue, .10; " .90; " 9.50

MISCELLANEOUS ARTICLES.



FIG. 1442.

For the convenience of both mechanics and amateurs, we put up the following materials in small tin cans, about $2\frac{1}{2} \times 4\frac{1}{2}$ inches, and they will be found handy and useful about the shop and house. Prussiate of Potash is used for case-hardening; Vienna Lime for polishing steel.

Borax,	\$0.25	Emery,	\$0.20
Crocus,	.25	Corundum,	.30
Rosin,	.20	Pulv. Glue,	.20
Pumice Stone,	.25	Vienna Lime,	.35

Prussiate of Potash, \$0.50.

Arkansas Oil-Stone Powder, per can, \$0.50

The following articles we can furnish and will be pleased to name prices upon application, stating quantity:

Pumice Stone, in Lump,
" " Powdered,
Rotten Stone, in Lump
" " Powdered,
Lump Chalk,
Keel (a hard red chalk, used for marking lumber).

HARD FIBRE.

Hard Fibre is largely used in Electrical work, taking the place of Hard Rubber. There are three colors, red, gray, and black; the red being most commonly used. It is furnished in Tubes, both round and square, up to 2 in. diam.; in round Rods from $\frac{1}{4}$ to $1\frac{1}{2}$ in. diam.; in Sheets from .005 to $1\frac{1}{2}$ in. thick; also in Washers, Discs, Handles, and Fittings of all kinds. We carry but few sizes in stock, usually filling orders from factory.



FIG. 1443. TUBE.

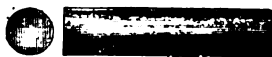


FIG. 1444. ROD.

Prices and further information upon application.

THIS BOOK is copyrighted and we caution all parties against using, without our written permission, any of the original matter contained herein.

We also handle Raw Hide goods.

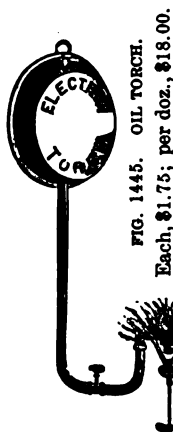


FIG. 1445. OIL TORCH.
Each, \$1.75; per doz., \$18.00.

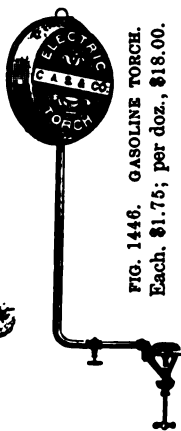


FIG. 1446. GASOLINE TORCH.
Each, \$1.75; per doz., \$18.00.

The Oil Torches, Fig. 1445, are largely used in foundries, blacksmith shops, machine shops, tunnels, etc.; principally for indoor use. They make a brilliant light. Burn best water-white oil.

Gasoline Torches, Fig. 1446, are used largely by trades desiring a heavy, bright light, and for outside use generally; cannot be blown out by a heavy wind.



FIG. 1447. DOUBLE GASOLINE TORCH.
Double Gasoline Electric Torch; each, \$2.75; per doz., \$30.00.

Extra Burners, suitable for any torch, each, \$1.25; per doz., \$12.00.

The Jumbo Torch (not illustrated) is the largest and most powerful light of this kind we know. It has three times the lighting capacity of the regular torch, and the cost of operation is less in proportion. Price, complete, each, \$2.75; per doz., \$30.00. Extra Burners, each, \$1.75; per doz., \$18.00.

GASOLINE FIRE POTS AND TORCHES.

Gasoline Fire Pots were first placed upon the market in somewhat crude form, about ten years ago. Originally they were intended more especially for the use of plumbers and tinsmiths, but their great advantages have led to their being used for an endless variety of purposes.

Up to the present time there have been issued two hundred and eighty-six patents, based upon various forms of burners and general construction.

The line of Gasoline appliances which we show here is uncommonly complete, and the goods are, we believe, superior in all respects. A very desirable feature of these goods is, that the tanks are stamped out of sheet brass $\frac{1}{4}$ inch thick, which makes them practically indestructible. This refers to all Torches and Fire Pots from Figs. 1448 to 1453 inclusive.

We are prepared to furnish to order, Torches, Burners and Heaters for any purpose that may suggest itself to our customers, and will be pleased to furnish any information desired.



FIG. 1448. NO. 1 HELPER. \$5.40.

The No. 1 Helper is the best "all around" Pot. It is safe, durable, simple to handle and control. Can be instantly changed from an intense heat to a low fire or the reverse. Stands 12 inches high, its base being 9 inches in diam. It will run an ordinary day's work on a half gallon 74° (or stove) gasoline, without any attention but a few minutes pumping with the rubber bulb to keep up the necessary air pressure. It gives a high,

steady, smokeless, odorless, and continuous heat. For indoor work it is the cleanest Pot in use, and on outside work is not affected by the highest wind.

The burner is flexibly mounted on the tank. The hood can be removed from the tank, by slacking back on the thumb-screw. The burner can be reversed and used in any position as a torch, for thawing out pipes, melting joints, burning paint from roofs, unsoldering pipes, "burning" and retinning galvanized iron, tempering tools, starting joints, melting anti-friction metal, etc. Simple and ample means are provided for cleaning out burner should it become "clogged."



FIG. 1449. NO. 2 HELPER. \$8.50.

Has two burners, with large hood for those using large pots. By detaching the hood, both burners can be effectively used in melting out "caulked" joints, etc. This is the most powerful heater used in the plumbing trade and is especially adapted for roofers. Will heat 8, 10 or 12 lb. irons for constant use, and can not be "blown out" by any wind that a roofer may work in; the irons remain clean, and the handles cool. Good and heavy brazing can be done by the proper management of the two burners. The pot being double the ordinary capacity, is too heavy for ordinary jobbing, but is just right for heavy contract work, or as a shop forge.

Best Rubber Bulbs, 30 cents each, postpaid. Can furnish Burners, Air Valves, etc.

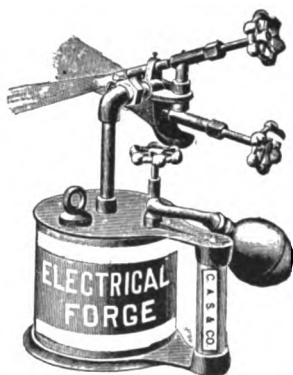


FIG. 1450.

GASOLINE ELECTRIC FORGE. \$5.40.

This Forge is especially made for electricians, plumbers, tinner, roofers and engineers. It is safe, durable, easily repaired, has a reversible burner that can be used in any position, and will not blow out in a gale of wind. Can be used as a blow pipe torch or a Fantail Heater, and can be instantly changed from an intense heat to a feeble flame, or the reverse. We mount these torches double, and as such they are used by Coppersmiths, Cycle Makers, and others for brazing, by Ice Machine men, Glass Blowers, and in any trade requiring a strong and steady flame without the use of a bellows.



FIG. 1451.

DIAMOND GASOLINE TORCH. \$3.25.

This is the most convenient little Torch in the market; it is made of brass, and the burner is so constructed that the flame can be regulated to suit the work.

It is made for light work, by Plumbers, Gas Fitters, Electricians, Painters, Jewelers, etc.

The tank holds about half pint gasoline. The handle can be adjusted at any angle to suit the operator, or it may be detached to carry in pocket. The flame is very strong, and is not easily blown out.

FIG. 1452.

FAVORITE PAINT
BURNER.

Price, \$5.00.



This is especially adapted for outside work, as it will stand the heaviest gale of wind. It is the only device for this class of work we know of that is perfectly under the control of the operator, and will work on oil finish, as well as on the heaviest body paint.

Can be used as a Torch for lighting street lamps.

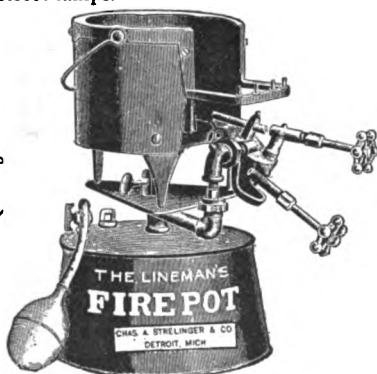


FIG. 1453. NO. 1 LINEMAN FIRE POT.

Price, \$10.00.

This is made particularly for electrical line workers, has a double jet burner, and is flexibly mounted so that the flames can be used on the outside of tank or hood. The upper flame of burner is a needle flame, and the lower a broad flame, which is used for melting metal. The hood can be detached from the tank, thereby leaving the burner to be used as a torch. A long melting pot is furnished with each of these.

NO. 2 LINEMAN FIRE POT.

(Not illustrated.)

The No. 2 Lineman is the same as No. 1, with an additional single jet burner, as shown on No. 1 Helper, Fig. 1448, and is used for heavy work where very strong flames are required. Price, \$12.00.

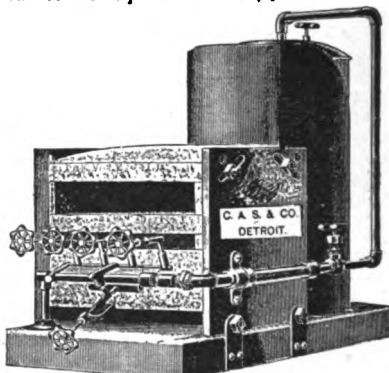


FIG. 1454. TOOL DRESSER. \$35.00.

This heater takes the place of a forge for heating tools, for dressing, tempering and annealing. It is operated by gasoline and so constructed that when the burners are started it does its work without any further attention from the operator, and will heat a number of tools at the same time at less expense than any other forge. No shop requiring tool dressing can afford to be without one.

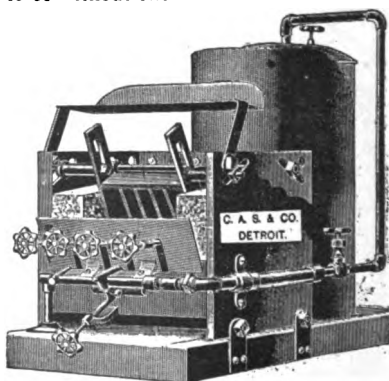


FIG. 1455. RIVET HEATER. \$40.00.

This machine is for heating rivets for boiler makers, sheet iron workers, bridge

Can furnish other Gasoline Apparatus.

contractors, etc. It is operated by gasoline and takes the place of a blast-furnace, and will heat rivets as fast as a man can drive them.

The rivets are placed in a hopper, and as fast as the heated ones are removed, others drop down and take their place, thereby saving much time and expense.



FIG. 1456. CONFECTIONERS' GASOLINE FURNACE. \$16.00.

Is made to take the place of Stationary Cooking Apparatus; not requiring Coal or Coke, it has no equal in the market for quick and effective work; can be started in a few moments, and when through, turned off instantly, thereby doing away with the unpleasantness of a hot stove or furnace during warm weather; is easily operated and can be moved from one place to another, as it weighs only twenty pounds when filled. Price of this furnace is extremely low, in comparison with its economical results.



FIG. 1457. CONFECTIONERS' GASOLINE BATCH HEATER. \$35.00.

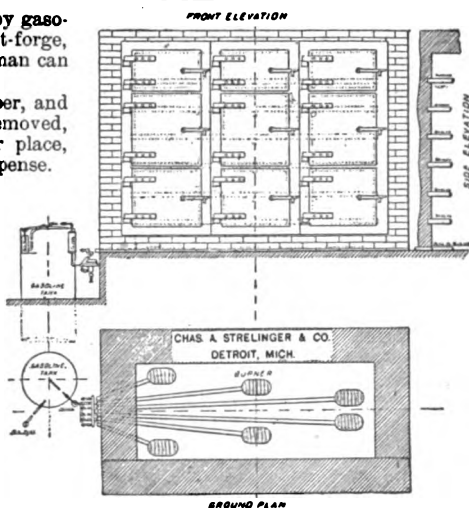


FIG. 1458. CORE OVEN.

The above cut represents a Core Oven heated by our new device with gasoline, of which we have a number in successful operation with the best of satisfaction to the users. It is also applicable for Japanese ovens.

It is not necessary to build new ovens in order to put in our gasoline plant, nor is it necessary to store the fuel near the ovens, as it can be conducted by the supply tank, which may be two hundred feet away from the building if preferred. In using this fuel with our system, an oven can be heated ready for baking cores, in fifteen minutes from the time the burners have been started, and the results therefrom are such that the cores are baked evenly, and never come out green on one end and burnt on the other. The temperature can always be controlled in such a manner, that after the oven is once heated it requires but one-half the fuel to keep the required temperature to do the work.

It will save the cost of the plant to any concern in the difference on the loss of cores, and expense of handling coal and ashes.

Further instructions and prices furnished upon application.

CHAIN HOISTS.

It seems almost unnecessary for us to enlarge upon the many advantages to be derived from the use of Chain Hoists. The Chain Hoist is not merely a convenience, but an absolute necessity—as a matter of *economy*—in the handling of objects, or materials, that are beyond the strength of a single person to handle, unaided by machinery, etc.

We have sold Chain Hoists (often called Chain Blocks) for upwards of twenty years, usually carrying in stock a number of sizes in two or three different styles, and furnishing to our customers' orders, any other style that they might prefer. We found that the statements made by a great many Manufacturers of these goods (in catalogues and descriptive circulars) were unreliable, in many cases showing clearly that the manufacturer knew very little about other Hoists. For example, in one catalogue the following statement is made: "This Hoist is guaranteed to lift two to three times as fast as any other, without exception." Now, as a matter of fact, we know of three other styles of Hoists, all of which are faster than the one referred to, one of them, in fact, being nearly twice as fast.

During the past year, we obtained at various times, from one to three different sizes each of seventeen different styles of Chain Hoists; thirteen of these were made in this Country, the remaining four being Imported. These Hoists were gotten simply for the purpose of testing and examining them, with a view to ascertain which were the best. We had hoped to be able to find a Hoist that would combine all the advantages required, but in this we were disappointed, and, as will be seen further on, we are obliged to show several styles in order to have a line that would be complete and suitable for all purposes.

In selecting a Chain Hoist, the following are the main points for consideration:

AS TO EASE IN LIFTING—This in most cases is an important feature, especially where a Hoist is required to be used often, as it makes considerable difference whether one or three men are required to lift a given load.

AS TO SPEED—It is, of course, a mechanical law, that in order to obtain the greatest speed we must sacrifice somewhat in the amount that can be lifted. Therefore, as a rule, the Hoist that is the speediest will not lift a given load as easily as the one that is slower. However, we find that certain Hoists (by reason of superior construction, ingenious combination of gears and the various other parts) have had the amount of friction reduced to a minimum point, resulting in gain both in speed and lifting qualities.

As examples confirming the above statement, we take the "Facile," Fig. 1460, and the "Triplex," Fig. 1461, in the one ton sizes. With the "Facile," a man of ordinary strength can easily lift 1500 lbs., and a strong man 2,200 lbs., and at the same time it will hoist much more quickly than any block we have ever used or heard of. The "Triplex" excels all other Blocks in regard to amount of weight that can be lifted, and yet, with the exception of one other, is as speedy as any.

AS TO WEIGHT—In cases where a Chain Hoist has to be carried about from place to place, and its position often changed, it is essential that it be as light as possible, without sacrificing in any way its strength. We have, in describing the different Hoists, given a list of the weights complete.

AS TO COMPACTNESS—Oftentimes where ceilings are low, and there is but little head-room, Hoists of the type shown in Figs. 1460 and 1461 can be used to greater advantage than the other styles.

AS TO MATERIAL AND WORKMANSHIP—The parts of a Chain Hoist being nearly always subjected to heavy strains, it is of great importance that the

materials and workmanship be of excellent qualities. We fully guarantee all Hoists in these respects.

AS TO PRICE—It will be noticed that the prices of the different Hoists vary considerably, and in this regard customers will have to use their own pleasure. There are, perhaps, two fairly good reasons for buying cheap Hoists. First, when a Hoist is required but once in a great while and, secondly, when a man absolutely cannot afford to buy a better one, as a low-priced Hoist is certainly better than none at all.

In presenting the foregoing points, we might explain that certain features which are extremely necessary for one class of work, might not be so for another. For example, one of our customers wanted a Hoist suitable for using in connection with an overhead track, to be used almost entirely for handling radiators, weighing from 400 to 1000 lbs. each, and as they turn out a great many of these in a day, it was necessary the Hoist should be very quick in action, and at the same time that the weight could easily be handled by one man. For this particular purpose, we considered the one-ton "Facile," Fig. 1460, the most desirable, and upon a test being made, it was accepted. Since then we have sold them three more of the same kind. The first one has been in operation every day for three years, giving best satisfaction.

All Hoists shown and described are automatically self-sustaining, and the load will remain suspended whenever the hand-chain is let go.



FIG. 1459.

DIFFERENTIAL & GEARED CHAIN HOISTS.

In this class of Hoists are the Weston Differential (Direct and Geared), Eades Differential Geared, Eades Quick-Action, Facile, Teal, Speidel's "Economic," Moore's, and the Weston "Triplex."

WESTON CHAIN HOISTS.

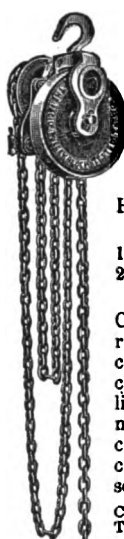
The Weston Differential Chain Hoist (Direct) has been on the market about twenty-five years, and is perhaps the best known of all; on account of being lower in price, they are more exten-

sively sold than others. With these Hoists, a man can lift from 800 to 1000 lbs.

LIST OF PRICES AND DIMENSIONS.

Capacity. Tons.	Price.	Lift. Feet.	Extra Lift. Per Foot.	Weight.
$\frac{1}{2}$	\$10.40	6	\$1.44	22 lbs.
$\frac{3}{4}$	12.00	7	1.52	29 "
1	16.00	8	1.60	50 "
$1\frac{1}{2}$	20.00	$8\frac{1}{2}$	1.68	81 "
2	24.00	9	1.76	122 "
3	32.00	10	1.92	173 "

THE "FACILE" CHAIN HOIST.



With this Hoist one man can raise from 1500 to 2000 lbs. It is the quickest acting Hoist we know of. Can be used to advantage where ceilings are low, as it requires less head-room than is common, the space required for Block and Hook being as follows:

Quarter ton, 12 in.; $\frac{1}{2}$ ton, 14 in.; 1 ton, 17 in.; $1\frac{1}{2}$ ton, 20 in.; and 2 ton, 26 in.

Can furnish special length Chains. The length of Chain required is one ft. of load chain and two ft. of hand chain for each foot of extra lift, although it is not always necessary to have the hand chain as long as the load chain, and they can be ordered separately.

FIG.	Cap. Tons.	Price.	Distance of Lift.	Weight.
1460.	$\frac{1}{2}$	\$17.00	8 ft.	32 lbs.
	$\frac{3}{4}$	21.25	8 "	45 "
	1	25.50	8 "	80 "
THE	$1\frac{1}{2}$	34.00	9 "	112 "
FACILE	2	45.00	10 "	166 "

THE WESTON

TRIPLEX SPUR GEAR BLOCK.

This Block, illustrated in Fig. 1461, (next page) is comparatively new, having been on the market but two or three years. The Gearing, which is of steel and bronze, consists of a triple spur train on the sun and planet system. The designer has succeeded in obtaining an uncommon combination, i. e., ease in hoisting combined with speed.

The Triplex is, with exception of the

Facile, Fig. 1460, as speedy as any Chain Hoist made, being in this respect the same as the Weston, and 50 per cent faster than any "Screw" Hoist we know of.

In the Triplex Block is attained a greater degree of efficiency than has ever before been secured in a hand-hoisting device, nearly four-fifths of the effort on the Hand Chain being utilized for lifting purposes, and one man can lift the full capacity of the Hoist with ease.

In testing this Hoist, the writer (who is a big, sturdy fellow) had no difficulty in lifting 5300 lbs. with a two-ton Hoist.

Another advantage is that this Block takes comparatively little head-room.

The Triplex Hoist is, in quality of materials, workmanship, and general construction, very superior.

WESTON'S TRIPLEX BLOCK. FIG. 1461.

Capacity. Tons	Price	Lift Feet	Extra Lift Per Foot	Weight
$\frac{1}{2}$	\$30.00	8	\$1.25	55 lbs
1	40.00	8	1.50	90 "
$1\frac{1}{2}$	50.00	8	1.75	120 "
2	60.00	9	2.00	150 "

SCREW HOISTS.*

In the class of Hoists operated by means of a Worm and Worm Gear, and known as "Screw" Hoists, are the Harrington, Box, Weston's "Duplex" (new), Batt, "Half-Chain" (English), and King.

Among the more intelligent class of users, this type of Hoist has always been preferred.

*Another form of Screw Hoist is illustrated in Figs. 1463 and 1464.

The Hoists made by E. Harrington, Son & Co., and known as the "Harrington," are generally recognized as the standard in this class, are used by the U. S. Government, and in most of the first-class shops and manufactories throughout the country, some of the larger mills and locomotive works having as many as two hundred in use. The manufacturers have recently made a number of important changes, greatly improving these Hoists in many respects.

The "Harrington" is easy in lifting, one man being able to raise 4000 lbs., (with a two-ton Hoist); and as regards speed, will compare favorably with any Hoist in this class.

In this connection it would be well to say that the Weston Differential, Fig. 1459, and Triplex, Fig. 1461, are about 50 per cent, and the Facile, Fig. 1460, 100 per cent quicker hoisting than any Screw Hoist we HARRINGTON'S HOIST. know of at present, but the Screw Hoists have the advantage of much greater ease in lifting (excepting as opposed to the Triplex)

PRICE LIST OF HARRINGTON'S HOIST.

Capac. Tons	Price	Lift Feet	Extra Lift Per Ft.	Weight
$\frac{1}{2}$	\$20.00	8	\$1.20	52 lbs.
1	24.00	8	1.50	65 "
$1\frac{1}{2}$	32.00	8	1.75	76 "
2	44.00	9	2.00	140 "
3	60.00	10	2.30	226 "
4	76.00	10	2.40	258 "
5	112.00	12	3.00	625 "
6	144.00	12	3.75	750 "
8	208.00	12	4.75	875 "
10	272.00	12	6.00	925 "



FIG. 1462

TRAVELING WORM HOISTS.

These Hoists are powerful, simple, and very convenient; will raise and hold securely at any point to the full extent at which they are rated.

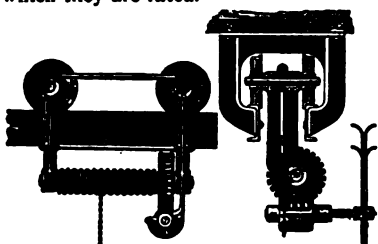


FIG. 1463.

No. 1, capacity 4000 lbs. Price, complete (as shown on Jib Crane, Fig. 1478), \$52.50.

Hangers for No. 1 Track, \$5.00 each. Track (Double), per ft., \$1.00. Track consists of 6 inch Steel Channels. Hangers should be about 8 ft. apart.

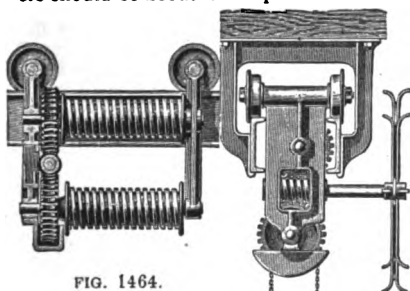


FIG. 1464.

No. 2, capacity 6000 lbs. Price, complete, \$82.50.

Hangers for No. 2 Track, \$7.75 each. Track (Double), per ft., \$1.20. Track consists of 8 inch Steel Channels. Hangers should be about 8 ft. apart.

ROPE HOISTS.

The Sure-Grip Steel Tackle Block has been on the market about five years, and during this time there have been upwards of 20,000 of them sold. They will be found extremely useful for medium and light work. The construction is such that the load can be held at any point without fastening the rope. Their low price recommends them for general purposes, especially in cases where lift is extra long.



INSTRUCTIONS FOR REEVING.

Enter rope at A pass wedge, and follow arrows as shown in cut. It will be noticed the two center ropes coming in contact with wedge always travel in same direction at same time. Take twist out of rope.

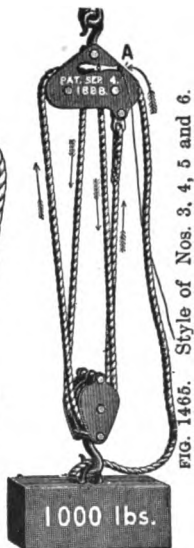


FIG. 1466. Style of Nos. 3, 4, 5 and 6.

No.	Price.	Size, Rope.	Capacity.	One Man Can Lift.
3	\$2.25	$\frac{1}{2}$ in.	600 lbs.	300 lbs.
4	4.15	$\frac{3}{4}$ "	1000 "	350 "
5	5.25	$\frac{7}{8}$ "	1800 "	400 "
6	8.15	1 "	2500 "	450 "
4 $\frac{1}{2}$	7.50	$\frac{1}{2}$ "	3000 "	600 "
5 $\frac{1}{2}$	9.00	$\frac{3}{4}$ "	3500 "	700 "
6 $\frac{1}{2}$	10.50	$\frac{7}{8}$ "	5000 "	850 "

Price list does not include Rope.

SURE-GRIP
STEEL TACKLE BLOCK
COMPLETE, WITH ROPE

For the convenience of our customers, we carry in stock a line of these Hoists fitted with best manilla rope, with hoisting capacity of 8 ft

No.	3	4	5	6
	\$2.60	4.65	6.10	7.95
No. 4 $\frac{1}{2}$			5 $\frac{1}{2}$	6 $\frac{1}{2}$
	\$8.35	10.50	12.95	

For each additional foot of Hoist, add to these prices, as follows:

No.	3	4	5	6
	\$0.06	.07	.11	.14
No. 4 $\frac{1}{2}$			5 $\frac{1}{2}$	6 $\frac{1}{2}$
	\$0.10	.15	.25	

FIG. 1466. Style of Nos. 4 $\frac{1}{2}$, 5 $\frac{1}{2}$ and 6 $\frac{1}{2}$.

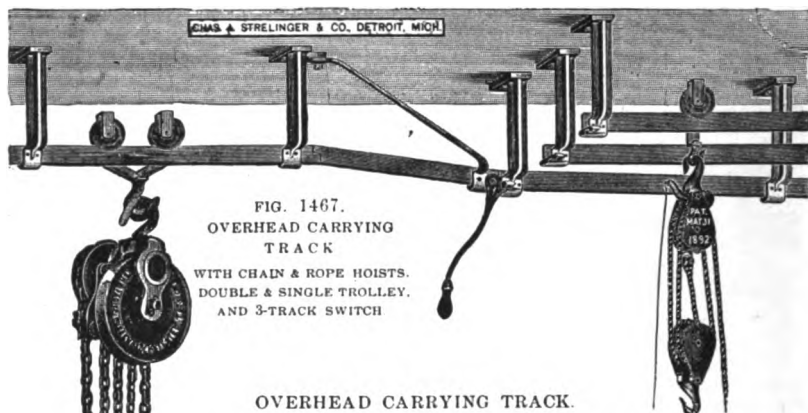


FIG. 1467.
OVERHEAD CARRYING
TRACK

WITH CHAIN & ROPE HOISTS.
DOUBLE & SINGLE TROLLEY.
AND 3-TRACK SWITCH

OVERHEAD CARRYING TRACK.

The handling of heavy goods on an overhead Trolley track has many advantages

First—A load may be lifted and conveyed clear of any merchandise standing on the floor.

Second—One man can handle a very much heavier load than in the old style system of conveying with a truck

Third—No floor space is required, in using a Hoist, thus affording a greater storage capacity.

By the use of an Overhead system, oftentimes an actual saving of 50 per cent in the cost of labor is gained, in addition to the fact that it lessens materially the liability to accidents.

In our judgment, there is hardly a machine shop, factory, warehouse, etc., that cannot use a certain amount of Overhead Track to great advantage

During the past few months, among other plants equipped by us, have been a Condensed Milk factory, for the quick handling of both full and empty cans, the full cans weighing about 125 lbs., a Seed establishment, for handling boxes and bags of seed, weighing up to 600 lbs., a Newspaper printing house, for handling rolls of paper up to 1000 lbs., a Foundry,

for handling ladles, flasks, etc.—capacity of 2500 lbs.; a Steel mill, for handling rolls and other heavy machinery parts—capacity 5000 lbs

We use the Carrying Track in our store, and could not afford to be without it if it cost five times the price that it did. We find by the use of this Track, one man (and he doesn't need to be very big or strong) can handle a Lathe, Punching Press, or any machine weighing not more than 4000 lbs., hoist it up, run it out into the alley and lower it on a truck, all without assistance, requiring but a few moments

In times gone by, when a machine of this weight was to be handled, it took from three to six men, with lots of fussing, a certain amount of "cussing", and bruised fingers, mashed toes, torn clothing, broken handles and other parts of machines were almost every day results.

Besides the Carrying Track shown and priced here, we are prepared to furnish other styles consisting of Steel Channels, or I Beams, in connection with which we can also furnish Turn-Tables, Switches, Geared and Plain Travelers.

In applying for estimate of cost of special Track, send sketch showing location of track, construction of roof, lowest point of obstruction under which traveler is required to pass, and height of room. Hangers must be low enough to reach below all obstructions crossing line of track. Also state heaviest load that Track will be required to carry.

**PRICE LIST OF FLAT CARRYING TRACK
SHOWN IN FIG. 1467.**

The following price list is for Tracks complete, with Hangers $3\frac{1}{2}$ ft. apart from center to center, on sizes Nos. 1 to 4 inclusive, and 3 ft. on larger sizes. Curved track same price as Straight.

No.	Complete, Per Ft.	Capac. Lbs.	Size, Track.	Trolleys.	
				Single.	Double.
1	\$0.20	350	$\frac{3}{4} \times 1\frac{1}{2}$	\$1.00	
2	.28	600	$\frac{3}{4} \times 1\frac{1}{2}$	1.50	\$3.00
3	.35	1000	$\frac{3}{4} \times 2$	2.00	4.00
4	.45	1500	$\frac{3}{4} \times 2\frac{1}{2}$		5.00
5	.60	2000	$\frac{3}{4} \times 3$		7.00
6	1.00	4000	$\frac{3}{4} \times 4$		9.00
7	1.75	8000	1x6		12.50

SWITCH TRACK, COMPLETE.

No.	1	2	3	4	5	6	7
Price, \$	3.00	4.00	5.00	6.00	7.50	9.00	12.50

HANGERS ONLY.

No.	1	2	3	4	5	6	7
Price, \$	0.25	.40	.55	.75	1.00	1.50	2.25

SPECIAL HANGERS.

In some cases, in order to clear obstruction, it is necessary to use Hangers with Long Drop. We can furnish extra length Hangers, and will name prices upon receipt of sketch and definite information regarding conditions under which Track is used.

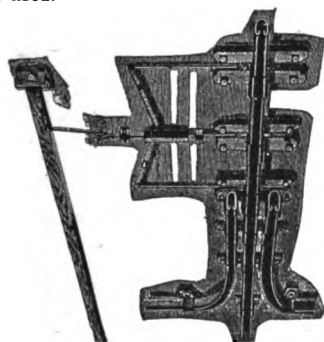


FIG. 1468.

COBURN TROLLEY TRACK CO.
OVERHEAD TRACK.

This furnishes a safe, practical, and labor-saving Overhead system for moving all kinds of merchandise.

It is usually very easy and economical to apply, that depending somewhat on the location and position of the timbers to which track-bed is to be secured.

At present we have three sizes of Track; Small, Regular, and Large. The Small Track is suitable for loads up to 600 lbs.; the Regular, to 1500 lbs.; and the Large, to 3000 lbs.

We sell the Track and Brackets separately, and the frequency with which the Brackets are applied depends upon the weight of loads to be propelled.

We carry the Track in stock in lengths of 2, 3, 4, 5 and 6 ft.

Small Track, for loads not exceeding 300 lbs., per ft., complete, \$0.20.

Small Track, for loads not exceeding 500 lbs., per ft., complete, \$0.25.

Regular Track, for loads not exceeding 1500 lbs., per ft., complete, \$0.75.

Large Track, for loads not exceeding 2500 lbs., per ft., complete, \$0.90.

Large Track, for loads not exceeding 3500 lbs., per ft., complete, \$1.10.

For Curved Tracks, add \$0.15 per ft. to the price of Straight Track in the Small size, and \$0.40 per ft. in the Regular and Large sizes.

Single Switches for Small Track, \$5.50; Reg. & Lge., \$10.00. Double Switches for Small Track, \$7.50; Reg. & Lge., \$12.50.

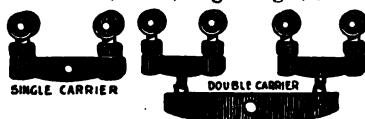


FIG. 1469. CARRIERS.

The Carriers are made of wrought and malleable iron, and have roller bearings.

Single Carriers for Small Track, \$3.75; Reg. & Lge., \$7.50. Double Carriers for Small Track, \$7.50; Reg. & Lge., \$15.00.

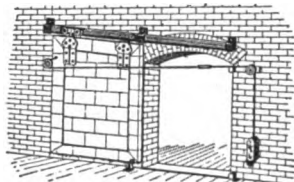


FIG. 1470. FIRE DOOR.

The above cut represents the Coburn Trolley Track and Hangers as used for Fire Doors. We think this is a most desirable system for purposes of this kind. We can furnish the Track and Hangers complete for Fire Doors, Fire Shutters, and Doors of all kinds.

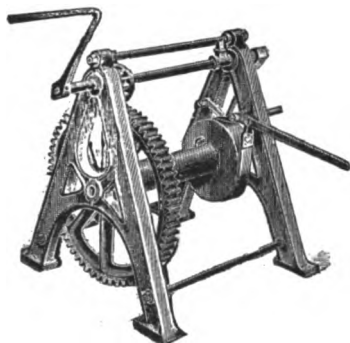


FIG. 1471. HOISTING CRAB OR WINCH.
SINGLE PURCHASE LEVER BRAKE.

These Crabs are constructed to lift direct from the barrel the load as indicated in list. The power is increased by the number of pulleys used in the block. The crank shaft can be thrown out of gear when lowering with the break, so the handles will not fly around.

Size No.	Lifts direct from Barrel.	Lifts with 2 and 3 Sheave Pulley Block.	Size of Bar'l.	Price, with Lever Brake.
101	800 lbs.	2 tons	12x4½	\$28.00
102	1200 "	3 "	14x4½	30.00
103	1600 "	4 "	16x4½	34.00
104	2000 "	5 "	18x4½	39.00

If wanted with Screw Brake, as shown in Fig. 1472, add \$3.50.

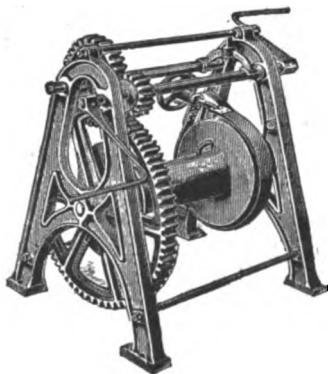


FIG. 1472. HOISTING CRAB OR WINCH.
DOUBLE PURCHASE, SCREW BRAKE.

The Double Purchase Crab is arranged

with two speeds and can be worked either Single or Double Purchase.

Size No.	Lifts direct from Barrel.	Lifts with 2 and 3 Sheave Pulley Block.	Size of Bar'l.	Price, with Lever Brake.
111	1000 lbs.	5 tons	18x4½	\$43.00
112	2500 "	6 "	19x5	55.00
114	3500 "	8 "	21x6	64.00
116	5000 "	12 "	22x6	76.00

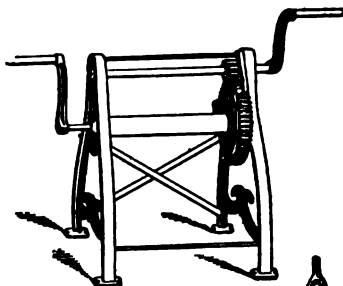


FIG. 1473.

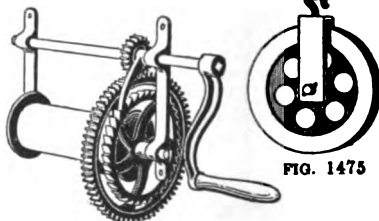


FIG. 1474.

No. 2, Fig. 1473, represents a Winch suitable for handling weights of about 2000 lbs. and under. The Barrel is 19 inches long, 3 inches diam.; Gears are 14 and 3 inches in diam. Height over all, 31 inches; width, 35 inches. Price, \$16.75.

No. 3 (not illustrated) is similar in style to the above, almost as strong, but smaller. The Barrel is 12 inches long, and 5 inches in diameter. Height over all, 18½ inches. Price, \$10.00.

No. 1, Fig. 1474, is a small Winch for putting on derrick or frame, suitable for weights of about 1500 lbs. and under. The Barrel is 14 inches long, 5 inches in diam. Height over all, 20 inches; width, 28 inches. Price, \$8.00.

Fig. 1475, represents a Sheave Wheel, often used in connection with Winches, suitable for any size rope up to 1½ inch diam. Diam. of wheel is 15 in. Price, complete, \$3.75.

PNEUMATIC HOISTS.

Too much can hardly be said in favor of Pneumatic Hoists, especially in establishments where a number of Hoists are required.

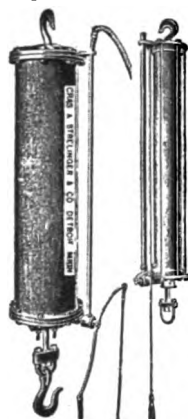


FIG. 1476.

Pneumatic Hoists possess many advantages over all other kinds of Hoists operated by hand power; are great savers of power and time, as they are readily operated; are entirely under control at all times, and require no skill to manage them. The valve is operated by the person using the Hoist, requiring no exertion, and it is just as easy to handle the heaviest weights as the lightest. They will lift at different speeds, the Hoist being entirely at the

operator's pleasure in this respect.

These Hoists are made in various sizes, for lifts varying from 800 lbs. or less, to 15,000 lbs. or more, if necessary. The height of the lift varying from 3 to 10 ft., the most commonly used height of lift being 4 ft.

Where there is head-room enough, they can be readily attached to a traveler or crane, and operated over a large space, the only limit being the length of the rubber supply hose.

To establish a Pneumatic system, it is only necessary to run an ordinary gas pipe throughout the shop for the main supply, with outlets where the Hoists are required.

We illustrate in Fig. 1477 an Air Compressor built especially for this class of work. The capacity of this Compressor is 35 cubic ft. of free air per minute, which is practically sufficient to operate any number of these Hoists

The purposes for, and the conditions under, which these Hoists can be operated are so varied, that we find it inexpedient to print a list of sizes or prices. We would be pleased to correspond with any

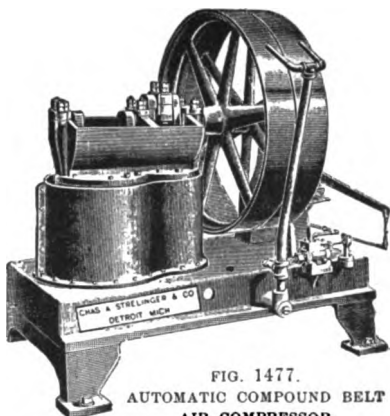


FIG. 1477.

AUTOMATIC COMPOUND BELT
AIR COMPRESSOR.

who may desire further information, and would ask that we be supplied with full particulars in regard to requirements.

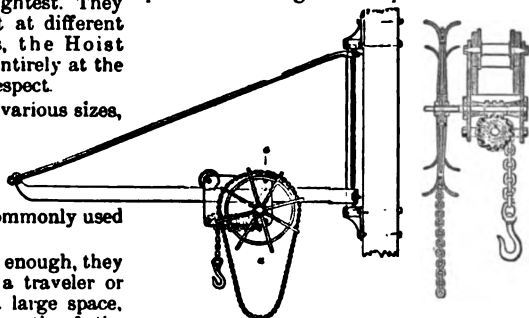


FIG. 1478. JIB CRANE.

We show here a Worm Hoist mounted and traveling freely on a Jib. It is quick in action and easily operated by one man; is powerful, durable and very convenient; will raise and hold securely at any point within the radius of the arm, from one lb. to the full rate at which it is rated.

No.	Price.	Radius of Swing.	Height of Clear Hoist.	Capacity, Lbs.
1	\$72.00	6 ft.	8 ft.	2000
2	100.00	6 "	11 "	3000
3	88.00	9 "	8 "	2000
4	116.00	9 "	11 "	3000
5	108.00	12 "	8 "	2000
6	136.00	12 "	11 "	3000

The extreme length of Jib is 18 inches more than the radius of swing.

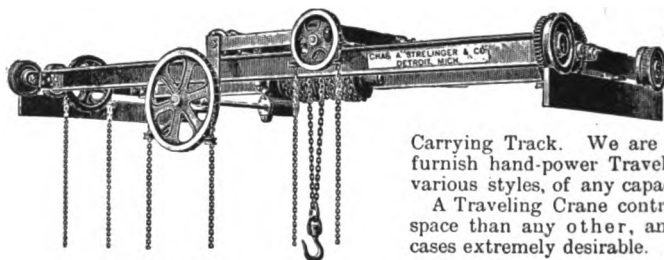


FIG. 1479.
SAFETY TRAVELING CRANE.

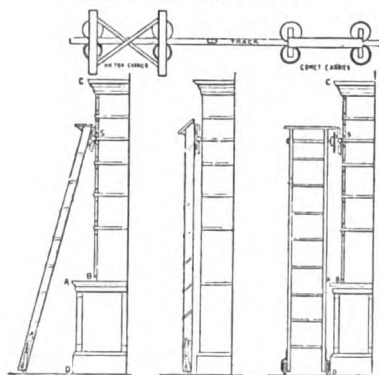


FIG. 1480. SLIDING LADDERS.

The use of Sliding Ladders in stores and warehouses is becoming quite general. The Sliding Ladders have many advantages over the ordinary Portable Ladders, and they are a great convenience and time-saver. We have had them in use for upwards of ten years, and could not afford to be without them at ten times their cost. We can furnish them in two styles, shown in cut; the "Victor," which rolls facing the shelves, and the "Comet," which rolls facing the eye. These Ladders move easily, look well, are never out of order, or in the way; they have roller bearings and anti-friction wheels, and are practically noiseless.

In writing, give distance from D to A, A to B, and B to S. Give entire length of each run of shelving. Also state number and kind of Ladders wanted.

Hard Pine solid side Ladders, ea., \$10.00
Solid Oak side Ladders, each, 12.50

Track all ready to put up, including screws, \$0.32 per running ft.

Fig. 1479 shows a style of Traveling Crane used in connection with the Flat Carrying Track. We are prepared to furnish hand-power Traveling Cranes of various styles, of any capacity and span. A Traveling Crane controls more floor space than any other, and is in many cases extremely desirable.

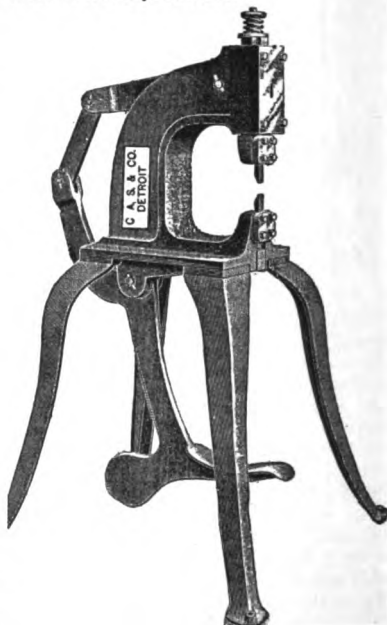


FIG. 1481. SPRUE CUTTER

This Machine is designed for use in brass foundries, for cutting castings from the gates; will take in a large range of work, having a depth of throat from cutting edge of 10½ inches, and a space up and down back of the cutting tools of full 12½ inches. Cutting capacity, ¼ inch square, common yellow brass castings, or its equivalent. The cutting tools are simple, consisting of two pieces of tool steel, 1½ x 1 inch. Weight of Machine, 520 lbs. Price, \$52.00.

We can furnish to order a variety of Sprue Cutters for Power use

COMPARATIVE TABLES OF GAUGES.

AMERICAN OR B. & S. GAUGE.			ENGLISH OR STUBS' GAUGE.			PIANO OR MUSIC WIRE GAUGE.			WOOD, OR MACHINE- SCREW GAUGE.		
No.	Size Decimal	Nearest Fraction.	No.	Size Decimal	Nearest Frac'n.	No.	Size Decimal	Nearest Frac'n.	No.	Size Decimal	Nearest Frac'n.
00	.3648	$\frac{1}{2}$	00	.38	$\frac{1}{2}$	2	.0105		0	.0578	
0	.32486	$\frac{1}{2}$	0	.34	$\frac{1}{2}$	4	.0125		1	.0710	
1	.2893	$\frac{1}{2}$	1	.3	$\frac{1}{2}$	6	.015	$\frac{1}{4}$	2	.0843	
2	.25763	$\frac{1}{2}$	2	.284	$\frac{1}{2}$	8	.019	$\frac{1}{4}$	3	.0973	$\frac{1}{4}$
3	.22942	$\frac{1}{2}$	3	.259	$\frac{1}{2}$	9	.022		4	.1105	$\frac{1}{4}$
4	.20431	$\frac{1}{2}$	4	.238	$\frac{1}{2}$	10	.0245		5	.1236	$\frac{1}{2}$
5	.18194	$\frac{1}{2}$	5	.22	$\frac{1}{2}$	11	.027		6	.1368	$\frac{1}{2}$
6	.16202	$\frac{1}{2}$	6	.203	$\frac{1}{2}$	12	.0285		7	.1500	$\frac{1}{2}$
7	.14428	$\frac{1}{2}$	7	.18	$\frac{1}{2}$	13	.0305	$\frac{1}{4}$	8	.1631	$\frac{1}{2}$
8	.12849	$\frac{1}{2}$	8	.165	$\frac{1}{2}$	14	.032		9	.1763	$\frac{1}{2}$
9	.11443	$\frac{1}{2}$	9	.148		15	.035		10	.1894	$\frac{1}{2}$
10	.10189		10	.134	$\frac{1}{2}$	16	.036		11	.2026	$\frac{1}{2}$
11	.090742	$\frac{1}{4}$	11	.12	$\frac{1}{2}$	17	.038		12	.2158	$\frac{1}{2}$
12	.080808	$\frac{1}{4}$	12	.109	$\frac{1}{2}$	18	.040		13	.2289	$\frac{1}{2}$
13	.071961	$\frac{1}{4}$	13	.095	$\frac{1}{2}$	19	.042		14	.2421	$\frac{1}{2}$
14	.064084	$\frac{1}{4}$	14	.083		20	.043		15	.2552	$\frac{1}{2}$
15	.057068		15	.072		21	.0445		16	.2684	$\frac{1}{2}$
16	.05082		16	.065	$\frac{1}{4}$	22	.047	$\frac{1}{4}$	17	.2816	$\frac{1}{2}$
17	.045257	$\frac{1}{4}$	17	.058		23	.049		18	.2947	$\frac{1}{2}$
18	.040303		18	.049	$\frac{1}{4}$	24	.053		20	.3210	$\frac{1}{2}$
19	.03589		19	.042		25	.056		22	.3474	$\frac{1}{2}$
20	.031961	$\frac{1}{4}$	20	.035		26	.0605	$\frac{1}{4}$	24	.3737	$\frac{1}{2}$
21	.028462		21	.032	$\frac{1}{4}$	27	.064		26	.4000	$\frac{1}{2}$
22	.025347		22	.028		28	.0685		28	.4263	$\frac{1}{2}$
23	.022571		23	.025		29	.0715		30	.4520	$\frac{1}{2}$
24	.0201		24	.022		30	.076	$\frac{1}{4}$			
25	.0179		25	.02							
26	.01594	$\frac{1}{4}$	26	.018							
27	.014195	$\frac{1}{4}$	27	.016	$\frac{1}{4}$						
28	.012641		28	.014							
29	.011257		29	.013							
30	.010026		30	.012							
31	.008928		31	.01							
32	.00795		32	.009							
33	.00708		33	.008							
34	.006304		34	.007							
35	.005614		35	.005							
36	.005		36	.004							
38	.003965										
40	.003144										

TABLE OF DECIMAL EQUIVALENTS
OF 8THS, 16THS, 32NDS, AND 64THS
OF AN INCH.

8THS.	16THS.	32NDS.	64THS.
$\frac{1}{8}$ — .125	$\frac{1}{16}$ — .0625	$\frac{1}{32}$ — .03125	$\frac{1}{64}$ — .015625
$\frac{1}{4}$ — .250	$\frac{1}{8}$ — .125	$\frac{1}{16}$ — .0625	$\frac{1}{32}$ — .03125
$\frac{3}{8}$ — .375	$\frac{3}{16}$ — .1875	$\frac{3}{32}$ — .09375	$\frac{3}{64}$ — .046875
$\frac{1}{2}$ — .500	$\frac{1}{4}$ — .250	$\frac{1}{8}$ — .125	$\frac{1}{16}$ — .0625
$\frac{5}{8}$ — .625	$\frac{5}{16}$ — .3125	$\frac{5}{32}$ — .15625	$\frac{5}{64}$ — .078125
$\frac{3}{4}$ — .750	$\frac{3}{8}$ — .375	$\frac{3}{16}$ — .1875	$\frac{3}{32}$ — .09375
$\frac{7}{8}$ — .875	$\frac{7}{16}$ — .4375	$\frac{7}{32}$ — .21875	$\frac{7}{64}$ — .109375
	$\frac{1}{2}$ — .500	$\frac{1}{4}$ — .250	$\frac{1}{8}$ — .125
	$\frac{9}{16}$ — .5625	$\frac{9}{32}$ — .28125	$\frac{9}{64}$ — .140625
	$\frac{5}{8}$ — .625	$\frac{5}{16}$ — .3125	$\frac{5}{32}$ — .15625
	$\frac{11}{16}$ — .6875	$\frac{11}{32}$ — .34375	$\frac{11}{64}$ — .171875
	$\frac{3}{4}$ — .750	$\frac{3}{8}$ — .375	$\frac{3}{16}$ — .1875
	$\frac{13}{16}$ — .8125	$\frac{13}{32}$ — .40625	$\frac{13}{64}$ — .203125
	$\frac{7}{8}$ — .875	$\frac{7}{16}$ — .4375	$\frac{7}{32}$ — .21875
	$\frac{15}{16}$ — .9375	$\frac{15}{32}$ — .46875	$\frac{15}{64}$ — .234375
		$\frac{1}{2}$ — .500	$\frac{1}{4}$ — .250
		$\frac{11}{16}$ — .6875	$\frac{11}{32}$ — .34375
		$\frac{3}{4}$ — .750	$\frac{3}{8}$ — .375
		$\frac{13}{16}$ — .8125	$\frac{13}{32}$ — .40625
		$\frac{7}{8}$ — .875	$\frac{7}{16}$ — .4375
		$\frac{15}{16}$ — .9375	$\frac{15}{32}$ — .46875

Unless otherwise instructed, orders for all sheet metals, excepting iron, steel and copper, also for brazed tubing, are filled according to the Brown & Sharpe (or American) gauge. Orders for wire of all kinds, also iron, steel and copper in sheets, and seamless tubing, according to the English (or Stubs') gauge.

Music Wire and Screw Gauges are used for nothing but music wire and screws.

NOTE.—On page 18 of this catalogue will be found an article on Wire Gauges, both interesting and profitable to read.

Table of Metric Equivalents, see page 7.

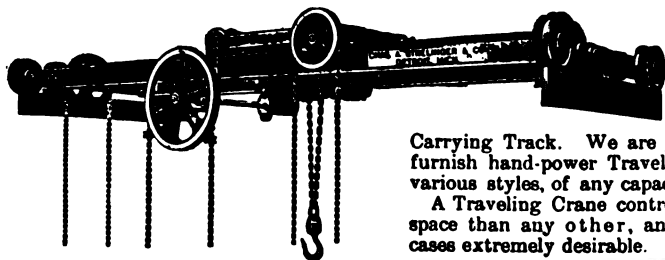


FIG. 1479.
SAFETY TRAVELING CRANE.

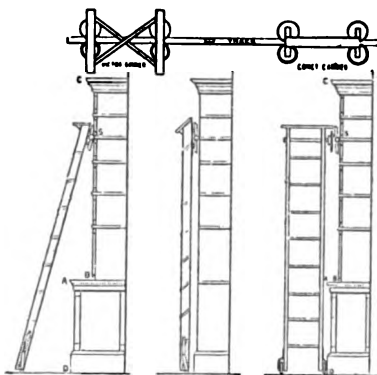


FIG. 1480. SLIDING LADDERS.

The use of Sliding Ladders in stores and warehouses is becoming quite general. The Sliding Ladders have many advantages over the ordinary Portable Ladders, and they are a great convenience and time-saver. We have had them in use for upwards of ten years, and could not afford to be without them at ten times their cost. We can furnish them in two styles, shown in cut; the "Victor," which rolls facing the shelves, and the "Comet," which rolls facing the eye. These Ladders move easily, look well, are never out of order, or in the way; they have roller bearings and anti-friction wheels, and are practically noiseless.

In writing, give distance from D to A, A to B, and B to S. Give entire length of each run of shelving. Also state number and kind of Ladders wanted.
Hard Pine solid side Ladders, ea., \$10.00
Solid Oak side Ladders, each, 12.50

Track all ready to put up, including screws, \$0.32 per running ft.

Fig. 1479 shows a style of Traveling Crane used in connection with the Flat

Carrying Track. We are prepared to furnish hand-power Traveling Cranes of various styles, of any capacity and span.

A Traveling Crane controls more floor space than any other, and is in many cases extremely desirable.



FIG. 1481. SPRUE CUTTER

This Machine is designed for use in brass foundries, for cutting castings from the gates; will take in a large range of work, having a depth of throat from 10 1/2 inches, and a space and down back of the cutting tools of 12 1/2 inches. Cutting capacity, 1/2 square, common yellow brass castings equivalent. The cutting tools are made of two pieces of tool 1 1/2 x 1 inch. Weight of Machine, 55 lbs. Price, \$52.00.

We can furnish to order a variety of Sprue Cutters for Power use

COMPARATIVE TABLES OF GAUGES

SIZES	ENGLISH			FRANC. OR METR.		WOOD OR METR.	
	OR STUBS GAUGE.			WIRE GAUGE		SHEET GAUGE	
No.	Size	Nearest	No.	Size	No.	Size	No.
		Fract'n.					
1	.36	1/8	2	.36	1	.0010	
2	.34	1/8	4	.32	1	.0010	
3	.32	1/8	6	.30	2	.0010	
4	.30	1/8	8	.28	3	.0010	
5	.28	1/8	10	.26	4	.0010	
6	.26	1/8	12	.24	5	.0010	
7	.24	1/8	14	.22	6	.0010	
8	.22	1/8	16	.20	7	.0010	
9	.20	1/8	18	.18	8	.0010	
10	.18	1/8	20	.16	9	.0010	
11	.16	1/8	22	.14	10	.0010	
12	.14	1/8	24	.12	11	.0010	
13	.12	1/8	26	.10	12	.0010	
14	.10	1/8	28	.08	13	.0010	
15	.08	1/8	30	.06	14	.0010	
16	.06	1/8	32	.04	15	.0010	
17	.04	1/8	34	.03	16	.0010	
18	.03	1/8	36	.02	17	.0010	
19	.02	1/8	38	.01	18	.0010	
20	.01	1/8	40	.00	19	.0010	
21	.00	1/8	42	.00	20	.0010	
22	.00	1/8	44	.00	21	.0010	
23	.00	1/8	46	.00	22	.0010	
24	.00	1/8	48	.00	23	.0010	
25	.00	1/8	50	.00	24	.0010	
26	.00	1/8	52	.00	25	.0010	
27	.00	1/8	54	.00	26	.0010	
28	.00	1/8	56	.00	27	.0010	
29	.00	1/8	58	.00	28	.0010	
30	.00	1/8	60	.00	29	.0010	
31	.00	1/8	62	.00	30	.0010	
32	.00	1/8	64	.00	31	.0010	
33	.00	1/8	66	.00	32	.0010	
34	.00	1/8	68	.00	33	.0010	
35	.00	1/8	70	.00	34	.0010	
36	.00	1/8	72	.00	35	.0010	
37	.00	1/8	74	.00	36	.0010	
38	.00	1/8	76	.00	37	.0010	
39	.00	1/8	78	.00	38	.0010	
40	.00	1/8	80	.00	39	.0010	
41	.00	1/8	82	.00	40	.0010	
42	.00	1/8	84	.00	41	.0010	
43	.00	1/8	86	.00	42	.0010	
44	.00	1/8	88	.00	43	.0010	
45	.00	1/8	90	.00	44	.0010	
46	.00	1/8	92	.00	45	.0010	
47	.00	1/8	94	.00	46	.0010	
48	.00	1/8	96	.00	47	.0010	
49	.00	1/8	98	.00	48	.0010	
50	.00	1/8	100	.00	49	.0010	

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SHEET BRASS.

As to Gauge—The American, or Brown & Sharpe gauge is used for measuring Sheet Brass. Gauge table, see page 419.

As to Color—"High" Brass is yellow; "Low" Brass is red. "Low" Brass is never kept in stock, but made to order only, and lists 4 cents per lb more than common "High" brass.

As to Temper—We carry in stock "Soft" and "Spring" brass. Other grades, such as "Extra Soft", "Half Hard", etc., are furnished to order only.

As to Width—Wide brass is difficult to roll. We carry nothing wider than 16 inches in stock. Sheet brass 40 inches wide costs more than three times as much as 12 inches wide, and intermediate sizes in proportion.

As to Price—The following is the price list adopted by the American Brass Manufacturers, April 9th, 1894, this price list being subject to varying discounts, according to the quantity purchased. Following this list we have printed a table of prices by the foot, which is a convenience to those desiring small quantities:



FIG. 1452.

MANUFACTURERS' LIST SHEET BRASS.

Width, inches,	2 to 12	14	16	18
All Nos. to 20,	\$0.22	\$0.23	\$0.25	\$0.27
Nos. 21, 22, 23, 24,	.22	.24	.26	.28
" 25 and 26,	.23	.24½	.27	.29
" 27 and 28,	.23	.25	.28	.30

Add ½ cent per lb. for each number thinner than Nos. 28 to 38 inclusive.

Add 2 cents per lb. for Spring brass.

For Slitting metal narrower than 2 inches, an additional charge is made of from 1 to 12 cents per lb., according to width and thickness.

PRICES SHEET BRASS, "SOFT" OR "SPRING" PER RUNNING FOOT.

No.	Width in Inches.							
	½	¾	1	1¼	1½	1¾	2	2½
16	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.05	\$0.06	\$0.06
18	.02	.02	.03	.03	.04	.04	.05	.05
20	.02	.02	.02	.03	.03	.03	.03	.05
22	.02	.02	.02	.03	.03	.03	.03	.04
24	.02	.02	.02	.03	.03	.03	.03	.04

TABLE OF WEIGHTS OF WIRE AND SHEET METALS, PAGE 422.

Width in Inches.

No.	2	3	4	8	12
16	\$0.08	\$0.12	\$0.24	\$0.32	\$0.48
17		.11	.22	.29	.43
18	.07	.10	.19	.26	.38
19		.09	.18	.24	.35
20	.06	.08	.16	.21	.31
21		.07	.14	.18	.27
22	.05	.07	.13	.17	.25
23		.06	.11	.15	.22
24	.04	.05	.10	.14	.20
25		.05	.09	.12	.18
26		.04	.08	.11	.16
28		.04	.08	.10	.15
29		.04	.07	.10	.14
30		.04	.07	.09	.13

SAWED BRASS.

This refers to what is commonly known as "Bar" brass. Our usual stock is of the temper known as "Half Hard."

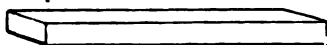


FIG. 1453.

PRICES PER RUNNING FOOT. Thickness.

Width	½	¾	1	1¼	1½	1¾	2
½	\$0.08	\$0.10	\$0.13	\$0.15	\$0.18		
¾	.12	.15	.18	.22	.28		
1	.15	.20	.22	.25	.32	\$0.36	\$0.45
1¼	.18	.22	.25	.28	.40	.45	.50
1½	.23	.28	.32	.35	.45	.50	.63
2	.28	.32	.38	.42	.60	.70	.85
2½	.37	.42	.48	.54	.75	.87	1.00
3	.45	.55	.62	.68	.85	.95	1.25
4	.55	.65	.75	.85	1.10	1.35	1.60

SHEET COPPER.

As to Gauge—The English or Birmingham gauge is used for measuring Sheet Copper. For Gauge table see page 419.

As to Quality—Our sheet Copper is rolled from the best Lake Superior stock.

As to Width—Being a soft, ductile metal, it can be rolled to almost any length, and there is no extra charge made excepting for very wide sizes.

As to Price—Sheet Copper is about 20 per cent higher than Sheet Brass.

HARD-ROLLED SHEET COPPER.

Used for Commutator brushes. We carry in stock a variety of thicknesses and widths. Prices upon application.

For Sawing metal and cutting to particular lengths, an additional charge is made of from 1 to 12 cents per lb., according to width and length.

SHEET PHOSPHOR BRONZE.

Phosphor Bronze is used quite largely for electrical purposes, and in many quarters is taking the place of sheet brass, which it excels greatly as to temper and non-corrosive qualities. It is also used to a great extent in marine work. We carry only the sheet metal, Spring Temper, in stock. Can furnish Castings, Rods, Nails, Bolts, etc. In small quantities we sell the sheet metal by the foot at prices given below. Prices on large quantities will be named upon application stating quantity.

PRICES PER RUNNING FOOT 6 INCHES WIDE.

No.	16	17	18	19	20	21
Per Ft.,	\$0.84	.77	.67	.63	.56	.49
No.	22	23	24	26	28	30
Per Ft.,	\$0.46	.39	.35	.28	.26	.24

PHOSPHOR-BRONZE CASTINGS.

We are prepared to furnish Castings of Phosphor Bronze; these Castings are made in different alloys, especially suited to the different purposes for which they are intended.

P.-B. "A," very tough.

P.-B. "B," tough and hard, and especially recommended to resist crystallization and corrosion.

P.-B. "C," hard and durable in resistance to wear and corrosion.

P.-B. "D," for valves, pumps, slides, etc.; nearly as hard as steel.

P.-B. "E," for bearings of heated rolls; valves, etc.; very hard.

P.-B. "G," for rods and bolts; very tough.

P.-B. "S," bearing metal, for locomotive, marine and stationary engines, roll-neck bearings, thrust rings, slide valves, etc.

We will be pleased to name prices upon application giving full particulars.

SHEET GERMAN SILVER.

As to Gauge—The American or Brown & Sharpe gauge is used for measuring Sheet German Silver. For Gauge table, see page 419.

As to Quality—German Silver is a composition of Copper, Spelter and Nickel. The quality is determined by the percentage of Nickel, which may run from 4 to 18 per cent. We carry in stock but one quality; that is the 18 per cent.

As to Width—German Silver is difficult to roll wide, and manufacturers charge

(27)

an extraordinary price for widths over 8 inches. We carry in stock but one width, 6 inches.

As to Price—In small quantities we sell G. S. at prices as given below. Prices on larger quantities will be named upon application stating quantity.

PRICE LIST PER RUNNING FOOT, 6 INCHES WIDE.

No.	16	17	18	19	20	21
Per Ft.,	\$0.48	.44	.38	.36	.32	.28
No.	22	23	24	26	28	30
Per Ft.,	\$0.26	.22	.20	.16	.14	.14

SHEET ALUMINUM.

As to Gauge—The American or Brown & Sharpe gauge is used for measuring Sheet Aluminum. For Gauge table, see page 419.

As to Quality—Our Sheet Aluminum will vary from 98 to 99½ per cent pure.

As to Width—Aluminum is difficult to roll wide, especially in the thinner sizes, 12 inches being about as wide as it is commonly rolled. We carry in stock but one width, 6 inches.

As to Weight—Sheet Aluminum has about one-third the weight of Sheet Brass.

PRICE LIST PER RUNNING FOOT, 6 INCHES WIDE.

No.	16	17	18	19	20	21
Per Ft.,	\$0.78	.72	.62	.59	.53	.46
No.	22	23	24	26	28	30
Per Ft.,	\$0.42	.36	.33	.27	.23	.22



FIG. 1484. PERFORATED METALS.

We can furnish to order metals with different sizes and shapes of holes. Some few styles are carried in stock, but for the greater part, Perforated Metals are furnished to order only. Prices and further information upon application.

TUBING.



FIG. 1485. BRAZED BRASS TUBING.

AS TO GAUGE—The American or Brown & Sharpe gauge is used for measuring Brazed Brass Tubing. For sizes of Gauge, see page 419.

AS TO DIAMETER—This tubing is sold by outside measurement.

AS TO LENGTH—It comes ordinarily in lengths of 12 ft. or thereabouts.

AS TO PRICE—The following is the price list adopted by the American Brass Manufacturers, April 9th, 1894, this price list being subject to varying discounts, according to the quantities purchased. Following this list, we have printed a table of prices by the foot, which will be found a convenience to those desiring small quantities.

MANUFACTURERS' LIST OF
BRAZED BRASS TUBING. PRICE PER LB.

All Nos.	No. 19	No. 20	No. 21	No. 22	No. 23	No. 24
Diam. to 19	20	21	22	23	24	
$\frac{1}{8}$ & $\frac{1}{4}$	\$1.50	\$1.52	\$1.54	\$1.56	\$1.58	\$1.62
$\frac{3}{8}$ & $\frac{1}{2}$	1.00	1.02	1.04	1.06	1.08	1.12
$\frac{5}{8}$ & $\frac{3}{4}$	.65	.67	.69	.71	.73	.77
$\frac{7}{8}$ & $1\frac{1}{8}$	.48	.50	.52	.54	.56	.60
$1\frac{1}{4}$ to $1\frac{3}{4}$	.41	.43	.45	.47	.49	.53
$1\frac{5}{8}$ & $1\frac{7}{8}$	.38	.40	.42	.44	.46	.50
2 & $2\frac{1}{8}$	.36	.38	.40	.42	.44	.48
$2\frac{3}{8}$ to 2 in.	.35	.37	.39	.41	.43	.47

Sizes 2 to 3 inch, add 3 cents per lb.

Square and Fancy Tubes (see Fig. 1487) add 8 cents per lb.

Extra Fancy patterns (see Fig. 1486) add 16 cents per lb

SPECIAL TUBING.

The word "Special" as applied to Tubing covers a great deal of ground. As a matter of fact, all Tubing may be classed as "Special," as we know of no manufacturer of Tubing that attempts to carry in stock any variety of sizes, in either the brazed or seamless tubes.

We deem it necessary to make this statement, as the majority of users seem to have the idea that they can get Tubing of any size at a moment's notice, while, as a matter of fact, it usually takes from two to six weeks to fill an order for a fair quantity, and on many sizes of Tubing

the manufacturers will not make a small quantity, for the reason that the cost of getting it out is many times more than they would dare ask for it.

We list in this catalogue, a good assortment of the more commonly used sizes, and mean, as far as possible, to have these sizes in stock at all times. We usually have many other sizes not listed.

Outside Diam.	B & S. Gauge.	Per Foot.	Outside Diam.	B & S. Gauge.	Per Foot.
$\frac{1}{8}$	22	\$0.05	$\frac{1}{4}$	17	\$0.18
$\frac{1}{4}$	22	.05	$\frac{3}{8}$	16	.20
$\frac{3}{8}$	22	.06	$\frac{1}{2}$	20	.16
$\frac{1}{2}$	22	.07	$\frac{5}{8}$	16	.22
$\frac{5}{8}$	18	.08	1	16	.23
1	20	.07	1	20	.17
$1\frac{1}{8}$	20	.08	$1\frac{1}{4}$	16	.24
$1\frac{1}{4}$	18	.08	$1\frac{3}{8}$	16	.26
$1\frac{3}{8}$	20	.07	1	20	.18
$1\frac{1}{2}$	18	.08	$1\frac{1}{2}$	16	.28
$1\frac{3}{4}$	17	.09	$1\frac{1}{2}$	16	.30
$1\frac{7}{8}$	20	.08	1	20	.20
2	17	.10	$1\frac{1}{2}$	16	.32
$2\frac{1}{8}$	17	.11	$1\frac{3}{8}$	20	.22
$2\frac{1}{4}$	20	.09	1	16	.35
$2\frac{3}{8}$	17	.12	$1\frac{1}{2}$	20	.24
2	17	.12	$1\frac{3}{8}$	16	.38
$2\frac{1}{2}$	20	.10	$1\frac{3}{8}$	16	.40
$2\frac{3}{4}$	17	.13	$1\frac{1}{2}$	16	.44
$2\frac{7}{8}$	20	.11	2	16	.50
3	17	.14	$2\frac{1}{4}$	16	.53
			$2\frac{3}{4}$	16	.57
			$2\frac{7}{8}$	16	.64
			3	16	.70
					.77

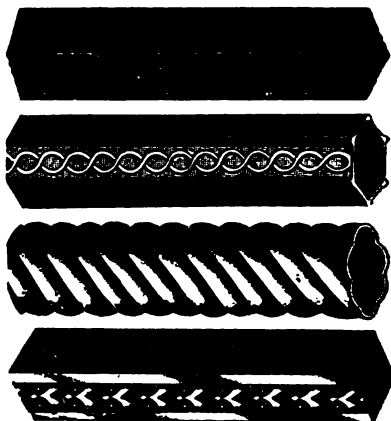


FIG. 1486. EXTRA FANCY PATTERNS.

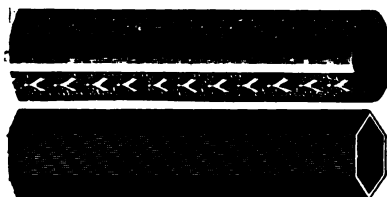


FIG. 1487. FANCY PATTERNS.

In Figs. 1486 and 1487 we illustrate a few styles of what are known as Extra Fancy and Fancy Patterns of Brass Tubing. There are perhaps no less than two hundred different styles made. This Tubing is not carried in stock, but is made to order only, and cannot be supplied in small quantities.

GERMAN SILVER TUBING.

German Silver Tubing of the best quality (15 per cent nickel) costs about four times as much as Brass Tubing.

The lower grade composition, say 4 per cent, costs about twice as much. We do not carry any German Silver Tubing in stock; can furnish it to order, but not in small quantities.

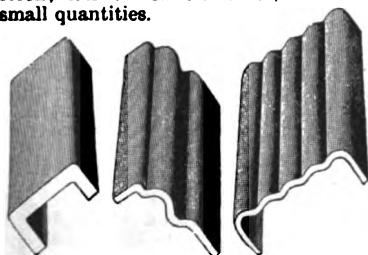


FIG. 1488. BRASS MOULDINGS.

We illustrate a few styles of Brass Moulding. These Mouldings can be furnished in a great variety of styles and shapes; are not kept in stock, but are made to order only, and cannot be supplied in small quantities.



FIG. 1489. SEAMLESS TUBING.

Seamless Tubing can be furnished in practically all sizes in diameter from $\frac{1}{4}$ to 5 inches; in thickness of walls, from $\frac{1}{16}$ of an inch (in the smaller sizes) up to $\frac{1}{2}$ inch thick; and in High and Low

Carbon Steel, Aluminum, Aluminum Bronze, Brass, Copper, Gold, Silver, Platinum, etc., etc. The manufacturers, as stated elsewhere, do not mean to carry a stock, but usually have a collection of sizes on hand, and can often fill orders immediately.

We usually carry in stock all sizes found in following tables:

SEAMLESS BRASS TUBING.

Outside Diam.	Eng. Gauge.	Per Foot.	Outside Diam.	Eng. Gauge.	Per Foot.
$\frac{1}{4}$	20	\$0.11	$\frac{1}{4}$	16	\$0.51
$\frac{1}{8}$	19	.12	$\frac{1}{8}$	12	.80
$\frac{3}{16}$	19	.13	$\frac{3}{16}$	16	.55
$\frac{1}{2}$	19	.14	2	12	.81
$\frac{5}{8}$	18	.16	2	16	.59
$\frac{3}{4}$	18	.18	$2\frac{1}{2}$	12	.87
$\frac{7}{8}$	18	.20	$2\frac{1}{2}$	16	.63
$1\frac{1}{8}$	18	.21	$2\frac{1}{2}$	12	.92
$1\frac{1}{4}$	17	.25	$2\frac{1}{2}$	16	.66
$1\frac{3}{8}$	17	.28	$2\frac{1}{2}$	12	.98
$1\frac{1}{2}$	17	.39	$2\frac{1}{2}$	16	.70
$1\frac{3}{4}$	17	.31	$2\frac{1}{2}$	11	1.13
1	16	.34	$2\frac{1}{2}$	16	.74
$1\frac{1}{8}$	16	.37	$2\frac{1}{2}$	11	1.25
$1\frac{1}{4}$	20	.27	$2\frac{1}{2}$	16	.81
$1\frac{3}{8}$	15	.42	3	11	1.37
$1\frac{1}{2}$	18	.32	3	16	.89
$1\frac{3}{4}$	14	.50	$3\frac{1}{2}$	11	1.49
$1\frac{7}{8}$	18	.35	$3\frac{1}{2}$	11	1.72
$1\frac{1}{2}$	14	.52	$4\frac{1}{2}$	11	2.07
$1\frac{3}{4}$	18	.37	$4\frac{1}{2}$	11	2.58
$1\frac{7}{8}$	13	.65	$5\frac{1}{2}$	11	3.15
$1\frac{1}{2}$	16	.47	$6\frac{1}{2}$	11	4.44
$1\frac{3}{4}$	13	.66			

THIN SEAMLESS TUBING.

These tubes are sometimes called "Telescope" tubes. Each size up to 1 inch fits into the next size larger, the wall of the tube being about $\frac{1}{16}$ of an inch thick.

Outside Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Per Ft.	\$0.12	.13	.14	.15	.17	.18
Outside Diam.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$
Per Ft.	\$0.20	.22	.25	.27	.28	.29
Outside Diam.	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{2}$
Per Ft.	\$0.30	.32	.35	.40	.45	

SEAMLESS COPPER TUBING.

Outside Diam.	Eng. Gauge.	Per Foot.	Outside Diam.	Eng. Gauge.	Per Foot.
$\frac{1}{4}$	20	\$0.12	$\frac{1}{4}$	16	\$0.47
$\frac{1}{8}$	19	.13	$\frac{1}{8}$	16	.54
$\frac{3}{16}$	19	.14	$\frac{3}{16}$	16	.63
$\frac{1}{2}$	18	.20	2	16	.72
$\frac{5}{8}$	18	.23	$2\frac{1}{2}$	16	.80
$\frac{3}{4}$	17	.28	$2\frac{1}{2}$	16	.90
$\frac{7}{8}$	17	.30	$2\frac{1}{2}$	16	1.00
1	16	.40	3	16	1.10
$1\frac{1}{4}$	16	.45			

BRASS & COPPER TUBING.

IRON PIPE SIZES.



FIG. 1490.

These Tubes are made to correspond in size with Iron Pipe, and can be used with regular Iron Pipe Fittings.

Nom'l I. Pipe Size.	Per Foot. Brass.	Per Foot. Copper.	Diam. Inside.	Diam. Outside.
$\frac{1}{8}$	\$0.20	\$0.22	.270	.405
$\frac{1}{4}$	.25	.27	.364	.540
$\frac{3}{8}$	.30	.32	.494	.675
$\frac{1}{2}$	.35	.38	.623	.840
$\frac{3}{4}$	.40	.43	.824	1.050
1	.55	.58	1.048	1.315
1 $\frac{1}{2}$	.75	.85	1.380	1.660
2	.90	1.00	1.611	1.900
2 $\frac{1}{2}$	1.15	1.25	2.067	2.375
3	1.90	2.00	2.468	2.875
3	2.50	2.65	3.067	3.500

Larger sizes furnished when required. When we cut less than one foot lengths, we charge 5 cents on all sizes up to 1 inch, and 10 cents on larger sizes.

BRASS PIPE FITTINGS.

Brass Pipe Fittings are made in almost as great a variety as Iron Pipe Fittings. We carry in stock the more commonly used styles, in both the Plain and Finished. Finished Fittings are Polished.



FIG. 1491. ELBOW.

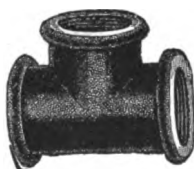


FIG. 1492. TEE.



FIG. 1493. CROSS.



FIG. 1494. LOCK NUT.

FIG. 1495.
PLUG.FIG. 1496.
CAP.FIG. 1497.
COUPLING.

FIG. 1498. UNION.



FIG. 1499.

RETURN BEND, OPEN.



FIG. 1500.

RETURN B'D, CLOSE.

PRICE LIST PLAIN AND FINISHED FITTINGS.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Elbow, Plain	\$0.05	\$0.06	\$0.08	\$0.12	\$0.16
" Finished,	.10	.12	.15	.21	.27
Tees, Plain,	.06	.08	.10	.14	.20
" Finished,	.12	.15	.21	.30	.39
Crosses, Pl'n,	.08	.10	.14	.20	.25
" Finished,	.18	.21	.33	.42	.51
Lock Nuts, Pl.	.04	.04	.05	.08	.10
" " Fin.	.06	.06	.08	.11	.14
Plugs, Plain,	.03	.04	.08	.09	.10
" Finished,	.06	.08	.09	.12	.15
Caps, Plain,	.04	.05	.08	.10	.14
" Finished,	.08	.09	.12	.15	.21
Coupling, Pl.	.04	.05	.08	.10	.14
" Finished,	.08	.09	.12	.15	.21
Unions, "	.21	.24	.33	.45	.60
Ret. Bends, Close, Plain,				.20	.33
" " Open,				.24	.36
Size,	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	3
Elbow, Plain,	\$0.23	\$0.38	\$0.52	\$0.68	
" Finished,	.39	.66	.90	1.20	
Tees, Plain,	.32	.45	.57	.80	
" Finished,	.60	.90	1.20	1.65	
Crosses, Pl'n,	.36	.52	.63	.88	
" Finished,	.76	1.14	1.50	2.10	
Lock Nuts, Pl.	.12	.18	.23	.42	
" Finished,	.18	.27	.33	.60	
Plugs, Plain,	.12	.18	.23	.41	
" Finished,	.18	.30	.42	.72	
Caps, Plain,	.18	.27	.34	.57	
" Finished,	.27	.42	.51	.93	
Couplings, Pl.	.18	.27	.34	.57	
" Finished,	.27	.42	.51	.93	
Unions, Fin.	.84	1.14	1.65	2.40	
Return Bends, {					
Close, Plain, {	.41	.57	.90	1.24	
Return Bends, {					
Open, Plain, {	.45	.68	1.00	1.35	



FIG. 1501.

COLD DRAWN SEAMLESS STEEL TUBES.

These Tubes are smooth, both inside and out, and guaranteed to stand the severest tests; are used on Bicycle work, Hydraulic Presses, Locomotive, Fire, Marine, and other Boilers, also for Hollow Spindles and other purposes where lightness, strength, uniformity and durability are required.

AS TO GAUGE—The English or Birmingham Gauge is used for measuring Steel Tubes. Gauge table, see page 419.

AS TO DIAMETER—These Tubes are sold by outside measurement.

AS TO LENGTH—Our Stock Lengths are in the neighborhood of 12 ft.

AS TO SIZES—These Steel Tubes are made in diameters from $\frac{1}{2}$ to $2\frac{1}{2}$ inch, and in thickness from No. 3 gauge (in the larger sizes) to No. 28 gauge. We mean to have in stock at all times the sizes as given in table, and can furnish other sizes to order.

AS TO PRICE—The prices given in table are what we charge by the foot when we cut lengths. Prices on larger quantities will be named upon application stating quantity.

PRICE, PER FOOT.

	16	18	20	22
Diam. Gauge.	Gauge.	Gauge.	Gauge.	Gauge.
$\frac{1}{2}$			\$0.32	\$0.33
$\frac{3}{4}$			.32	.32
$\frac{1}{2}$	\$0.30	\$0.30	.32	.32
$\frac{3}{4}$	.30	.30	.32	.32
$\frac{1}{2}$	.30	.30	.32	.32
$\frac{3}{4}$	.32	.30	.32	.32
$\frac{1}{2}$	.34	.32	.34	.34
$\frac{3}{4}$	.36	.36	.38	
1	.38	.38	.40	
$1\frac{1}{4}$	.42	.40		
$1\frac{1}{2}$	.44	.44		
$1\frac{3}{4}$	.50			

BOILER TUBES.

We carry a line of best quality Boiler Tubes in stock. Can furnish all sizes and lengths, also Seamless Copper Tubes for boilers.

PRICE LIST CHARCOAL IRON TUBES.

Outside Diam.	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$
Per Foot,	\$0.16	.15	.14	.13	.11	.13
Outside Diam.	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	4	$4\frac{1}{4}$
Per Foot,	\$0.14	.16	.17	.22	.26	.30

BRASS AND COPPER WIRE.

AS TO GAUGE—At a meeting of the American Brass Manufacturers, April 9th, 1894, it was decided to adopt the American (or B. & S.) Gauge as the Standard for Brass, Copper and German Silver Wire. This will, we hope, ere long result, in the general adoption of the American gauge for other wires.

AS TO WEIGHT—On page 432 will be found a table giving approximate weights.

AS TO SOFT BRASS WIRE—We sell very little Soft Brass Wire for general purposes. Don't know the reason why. It is stronger than Copper Wire, almost as pliable, for many purposes is much better, and the price is quite a bit less.

AS TO SPRING BRASS WIRE—This wire deteriorates with exposure to the atmosphere, and as far as possible, should be bought only as needed, and kept wrapped in paper. We mean to send out nothing but best quality Spring Brass Wire.

In this connection, we might suggest, when the conditions will permit the use of it, that the best possible wire for Springs is the Steel Music Wire, page 437. While the price per lb. is very much more, the actual cost for Springs is not proportionately great, as in using the Music Wire, a much smaller size can be used to obtain the same or better results.

AS TO PRICE—The following is the price list adopted by the American Brass Manufacturers, April 9th, 1894, these prices being subject to varying discounts, according to the quantity purchased. For small quantities, we charge net list.

MANUFACTURERS' PRICE LIST.

English Gauge	Spring Brass.	Soft Brass.	Soft Copper.
No.			
00 to 10	\$0.95	\$0.23	\$0.31
10 to 16	.25 $\frac{1}{2}$	.23 $\frac{1}{2}$	.31 $\frac{1}{2}$
17 & 18	.26	.25	.32
19 & 20	.27	.25	.33
21	.28	.26	.34
22	.29	.27	.35
23	.30	.28	.36
24	.32	.30	.38
25	.34	.32	.40
26	.37	.35	.43
27	.40	.38	.46
28	.44	.42	.51
29	.47	.45	.54
30	.50	.48	.57
32	.57	.55	.73
34	.66	.64	.95
36	.78	.76	1.50

BRASS AND COPPER RODS.



FIG. 1502.

These Rods are used for many different purposes, such as the making of bolts, studs, pins, rollers, etc.

As to Size—We carry them in stock in fractional sizes as per list below. Can furnish other sizes to order, but not in small quantities.

As to Length—We carry these rods in stock in 8 ft. straight lengths, and can furnish longer lengths to order.

As to Price—The following is the price list adopted by the American Brass Manufacturers, April 9th, 1894; this price list being subject to varying discounts, according to the quantity purchased. Following this list we have printed a table of prices by the foot, which is a convenience to those desiring small quantities.

MANUFACTURERS' LIST BRASS RODS BY LB.

$\frac{1}{4}$ to 1 inch diam. inclusive,	\$0.24
No. 8 and less than $\frac{1}{4}$ diam.,	.26
Over 1 inch diam.,	.27
Smaller than No. 8 to No. 11,	.30

The above prices are on Round Rod. Hexagon and Square advance 2 cents per lb. over the Round Rod.

BRASS AND COPPER RODS PER FOOT.

Diam.	Round, Brass.	Square, Brass.	Hexagon, Brass.	Round, Copper.
$\frac{1}{16}$	\$0.02			
$\frac{1}{8}$	.03			
$\frac{3}{16}$	.03	\$0.05	\$0.05	\$0.04
$\frac{1}{4}$	.04	.06	.06	
$\frac{5}{16}$	.05	.08	.08	.06
$\frac{3}{8}$	.06	.09	.09	
$\frac{7}{16}$	.07	.10	.10	.08
$\frac{1}{2}$	.08	.11	.11	
$\frac{9}{16}$	.09	.12	.12	.11
$\frac{5}{8}$	.10			
$\frac{11}{16}$	.11	.16	.15	.14
$\frac{3}{4}$	.13			
$\frac{7}{8}$	.14	.19	.17	.18
$\frac{15}{16}$	.18	.24	.21	.23
1	.22	.32	.27	.28
$1\frac{1}{16}$	.27	.37	.31	.34
$1\frac{1}{8}$	.32	.45	.38	.40
$1\frac{1}{4}$	.40	.53	.45	.50
$1\frac{3}{8}$	.45	.63	.53	.56
$1\frac{1}{2}$	.52	.72	.62	.65
$1\frac{5}{8}$	.60	.83	.70	.75
$1\frac{3}{4}$	.72	.95	.80	.90
$1\frac{7}{8}$	.90			1.12
2	1.10	1.63	1.40	1.40

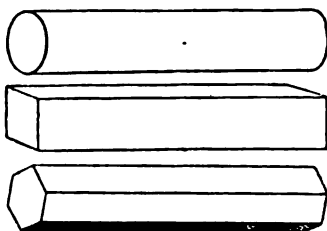


FIG. 1503.

LARGE SIZES OF BRASS AND COPPER RODS. PRICE PER FOOT.

Diam.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{2}$	2
Brass,	\$1.44	\$1.72	\$2.00	\$2.15	\$2.70	\$3.05	
Copper,	1.80	2.15	2.50	2.70	3.35	3.85	

On orders for Rods less than one ft. long, we charge extra for cutting, viz:

Sizes $\frac{1}{16}$ to $\frac{1}{4}$,	$\frac{3}{8}$ to $\frac{1}{2}$,	$\frac{5}{8}$ to 1 ,	$1\frac{1}{2}$ to $1\frac{3}{4}$,	$1\frac{3}{4}$ to 2
3 cts.	5 cts.	8 cts.	10 cts.	15 cts.



FIG. 1504. FANCY BRASS RODS.

We illustrate above, three styles of what are known as Fancy Brass Rods. These Fancy Rods are made in a great variety of patterns and shapes, and in sizes up to $\frac{1}{4}$ inch (some styles are made in larger sizes). These goods are not kept in stock, but are made to order only, and cannot be furnished in small quantities. Prices upon application, stating quantity.

PHOSPHOR BRONZE RODS.

We can furnish to order Phosphor Bronze Rods, all sizes, drawn to any degree of accuracy. Phosphor Bronze is especially valuable on account of its non-corrosive qualities. In price it is about three times as high as the brass rod. We have sold thousands of pounds of these rods for capsule pins and similar purposes.

ALUMINUM AND GERMAN SILVER RODS.

We can furnish to order in all sizes. Prices upon application, stating quantity.

STEEL RODS.

BESSEMER STEEL RODS, page 429.

CRESCENT STEEL DRILL RODS, page 433.

STEEL SHAFTING, page 356

PHOSPHOR BRONZE WIRE.

In many places Phosphor Bronze Wire is taking the place of Brass, which it excels greatly as to temper and non-corrosive qualities. We do not carry it in stock, furnishing it to order only. In price it is about three times as high as Brass wire.

The high prices asked for Phosphor Bronze Wire prohibit, to a great extent, its use for general purposes. We know of no good reason why it cannot be furnished at more reasonable prices, and think that it will be some day.

GERMAN SILVER WIRE.

AS TO GAUGE—The American (or B. & S.) Gauge is used. For Gauge table, see page 419.

AS TO TEMPER—We carry in stock the "Spring" temper. Other grades furnished to order only.

AS TO QUALITY—German Silver is a composition of copper, spelter and nickel. Quality is determined by the percentage of nickel, which may run from 4 to 20 per cent. We carry in stock but one quality, 18 per cent.

AS TO PRICE—The following is the manufacturers' price list, these prices being subject to varying discounts according to the quantity purchased. In small quantities we charge net list:

All Nos.	16	17	and 18	19	and 20	21
Price,	\$0.78	\$0.80		\$0.83		\$0.95
No.	22	23	24	26	28	
Price,	\$0.98	\$1.03	\$1.08	\$1.14	\$1.40	

CLEANING BRASS.

From "American Machinist."

"The method prescribed for cleaning brass in United States arsenals is said to be, to make a mixture of one part common nitric acid and one-half part sulphuric acid in a stone jar, having also ready a pail of fresh water and a box of sawdust. The articles to be treated are dipped into the acid, then thrown into the water and finally rubbed with sawdust. This immediately changes them into a brilliant color. If the brass has become greasy it is first dipped into a strong solution of potash and soda in warm water; this cuts grease, so that acid has full power to act."

NOTE.—We would suggest that if there is any quantity of this work to be done, the use of a number of pails of fresh water would be necessary. Running water is better still. C. A. S. & CO.

STEEL MUSIC, OR PIANO WIRE.



AS TO GAUGE—There is no absolute standard, the wire furnished by different makers varying but little. On page 419 we give a table of sizes.

AS TO USES—Although intended originally for use in the manufacture of musical instruments, Music Wire is being used in very large quantities for other purposes; in fact, we think there is more of it used for mechanical than for musical purposes. For the making of Spiral Springs, it is perhaps the best wire known; is very tough, and Springs are ready for use as soon as wound. Although higher in price than other Spring wires, it is in many cases better to use, being more elastic and much stronger, and smaller sizes may be used with far better results than are attained in brass wire.

This Wire is also largely used by Brick and Soap makers for cutting stock.

AS TO QUALITY—The best Music Wire is imported, there being, we believe, but one American manufacturer.

We are now putting up this wire in $\frac{1}{2}$ as well as one lb. packages. This will be found a great convenience by those desiring small quantities.

No.	2	4	6	8	9
$\frac{1}{2}$ lb.	\$1.00	\$0.70	\$0.50	\$0.40	\$0.35
1 "	3.20	2.20	1.40	1.10	1.00
No.	10	11	12 to 19	20 to 30	
$\frac{1}{2}$ lb.	\$0.30	\$0.30	\$0.25	\$0.25	
1 "	.90	.85	.80	.75	

Can furnish other sizes to order.

ALUMINUM WIRE.

AS TO GAUGE—American (or B. & S.) Gauge is used. Gauge table, see page 419.

AS TO WEIGHT—Aluminum Wire is about one-third the weight of Brass wire.

This Wire is furnished by the manufacturers in all sizes from No. 0000 to 40. The call for Aluminum wire is very light, and we carry in stock only the sizes as given below, and for the convenience of those desiring small quantities, we have priced it in 10 ft. rolls.

No.	2	5	8	11
Nearest Frac'n,	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Per 10 ft. Roll,	\$2.00	\$1.00	\$0.50	\$0.25
No.	14	17	20	
Nearest Frac'n,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	
Per 10 ft. Roll,	\$0.14	\$0.08	\$0.05	

Aluminum see page 439.

SPOOLED WIRE.

The most satisfactory form of handling small wire is on spools. We sell a great deal of Wire in this way. It is wound closely upon spools, and has a thin coating of shellac to prevent tarnishing. All sizes are by English gauge numbers.



FIG. 1505.

Small Spools of Wire of the following gauge numbers 20, 22, 24, 26, 28 and 30, as follows: Annealed and Tinned Steel, 5 cts; Soft Brass, Spring Brass, and Soft Copper, 3 cts. each.

ANNEALED STEEL WIRE.

Nos.	16 to 20	21 to 24	26 and 28
$\frac{1}{2}$ lb. Spool,	\$0.06	\$0.08	\$0.10
1 " "	.15	.20	.23
Nos.	30 and 32	34	36
$\frac{1}{2}$ lb. Spool,	\$0.12	\$0.14	\$0.16
1 " "	.25	.32	.43

ANNEALED TINNED STEEL WIRE.

Nos.	16 to 18	19 to 26	28 and 30
$\frac{1}{2}$ lb. Spool,	\$0.10	\$0.12	\$0.13
1 " "	.25	.30	.35

SOFT BRASS WIRE.

Nos.	16 to 21	22 to 25	28	30
$\frac{1}{2}$ lb. Spool,	\$0.15	\$0.18	\$0.23	\$0.25
1 " "	.45	.50	.70	.80

SPRING BRASS WIRE.

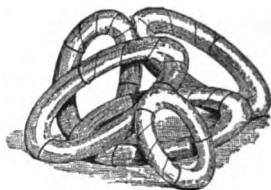
Nos.	16 to 21	22 to 24	24 to 26
$\frac{1}{2}$ lb. Spool,	\$0.15	\$0.18	\$0.20
1 " "	.45	.55	.60
Nos.	27, 28, 30	32	34
$\frac{1}{2}$ lb. Spool,	\$0.25	\$0.35	\$0.40
1 " "	.70	.90	1.10

SOFT COPPER WIRE.

Nos.	16 to 22	23 to 26	27 and 28
$\frac{1}{2}$ lb. Spool,	\$0.18	\$0.20	\$0.25
1 " "	.50	.58	.75
Nos.	30	32	34
$\frac{1}{2}$ lb. Spool,	\$0.30	\$0.35	\$0.45
1 " "	1.00	1.20	1.50

IRON AND STEEL WIRE.

While custom impels us to use the above heading, to describe in a general



way the following lines of Wire, we would state, as a matter of fact, that Iron Wire is an article almost unknown at the present day, the Bessemer and other processes having cheapened the cost of Steel Wire so, that, except for special purposes, there is no longer a demand for the Iron Wire.

AS TO GAUGE—Iron and Steel Wire is measured by the English (or Birmingham) Gauge. For Gauge table, see page 419.

AS TO WEIGHT—On page 433 will be found a table giving approximate weights on all sizes Wire.

SIZE OF BUNDLES—Annealed, Bright Market, and Coppered Market Steel Wire, all sizes to No. 16 inclusive, come in bundles weighing 63 lbs. The smaller sizes in what are known as "stones," weighing 12 lbs.

Coppered Spring, Tinned Spring, and Galvanized Steel Wire, come in bundles weighing 100 lbs.

AS TO OUR STOCK—We carry in stock such sizes as are listed under the head of "Broken Bundles," on following page. Other sizes furnished to order only, and it is difficult for us to supply them in small quantities.

AS TO PRICES—The following is the Manufacturers' list of prices, being subject to varying discounts, according to the quantity purchased. For the convenience of those who require smaller quantities, we have, under the head of "Broken Bundles," on following page, printed a list of prices at which we sell small quantities:

MANUFACTURERS' PRICE LIST,
ANNEALED, BRIGHT, COPPERED MARKET,
COPPERED SPRING AND GALVAN-
IZED WIRE.

Nos. 0 to 9	10 & 11	12	13 & 14	15 & 16			
Lb. \$0.10	11	.11½	.12½	.14			
No. 16	17	18	19	20	21	22	23
Lb. \$0.14	.15	.16	.19	.20	.21	.22	.23
No. 24	25	26	27	28	30	32	34
Lb. \$0.24	.25	.26	.28	.29	.32	.35	.40

MANUFACTURERS' PRICE LIST

TINNED WIRE.

Nos. 0 to 9	10 & 11	12 to 14	15 & 16
Lb. \$0.15	.16	.17	17½
Nos. 17 to 20	21 & 22	23 & 24	25 26
Lb. \$0.19	.20	.21	.22 .23
No. 27	28 30	32 34	36
Lb. \$0.24	.25 .27	.32 .34	.48

BROKEN BUNDLES.

In the following list are given the kinds and sizes of Wire we mean to carry at all times. This does not by any means represent the extent of our stock, but comprises the more commonly used kinds of Wire. The prices given here are for small quantities.

ANNEALED STEEL WIRE.

Nos. 3 to 11	12 to 14	15 & 16	17 & 18	19 & 20
Lb. \$0.04	.05	.06	.07	.09
No. 21 & 22	23 & 24	25 & 26	28 & 30	
Lb. \$0.10	.11	.12	.14	

COPPERED MARKET WIRE.

Coppered Market Wire has a smooth copper finish, is stiffer than the Annealed Wire, and is the same in temper as what is known as Bright Market Wire. We carry it in stock from Nos. 3 to 16. Price in small quantities same as Annealed Steel Wire list above.

COPPERED SPRING WIRE.

This is used for Springs of various kinds, also for coat-hangers and similar articles.

Nos. 3	6 to 9	10 & 11	12 to 14	15 to 18
Lb. \$0.06	.06	.07	.08	.09

TINNED SPRING WIRE.

This is similar to the Coppered Spring Wire, but it is tin-coated.

Nos. 3	6 to 9	10 & 11	12 to 14	15 to 18
Lb. \$0.09	.09	.10	.12	.14

GALVANIZED STEEL WIRE.

Nos. 8 & 9	10 to 12	13 to 14	15 & 16
Lb. \$0.05	.05½	.06	.06½

SPECIAL WIRE.

Some few of these kinds of Wire are carried in stock at factory, but for the most part they are made to order only and cannot be furnished in small quantities:

Bicycle Spoke, Bonnet or Hat, Book-binder, Broom, Brush, Cable Screw, Car Seal, Car, Cork Fastener, Corset Steel, Covering, Curtain Spring, Door Spring, Gun, Heddle, Hook and Eye, Key Pin, Mattress, Needle Steel, Pin, Pump Rod, Reaper, Reed, Spectacle, Staple, Twisted, Tack, Telegraph, Watch or Clock Spring.

FIG. 1506. BESSEMER STEEL RODS.

We carry these Rods in stock in 6 ft. lengths, all sizes, as per table. They are useful for many purposes, such as Pins, Rods, Rivets, Screws, Rollers, Bicycle Spokes, etc. Made of good steel, smooth, Coppered finish, are round, straight and true to size, within a limit of 1/100 of an inch.

Price, per lb., 1/16 to 1/2 in., 10 cts.; all sizes larger, 8 cts.

When we sell small quantities, we charge by the foot, as follows:

Diam.	1/16	1/8	3/16	1/4	5/16	3/8
Foot, \$0.02	.02	.02	.02	.02	.02	.02
Diam.	1/2	5/8	3/4	7/8	1	1 1/8
Foot, \$0.02	.02	.03	.03	.03	.03	.03
Diam.	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8
Foot, \$0.03	.03	.03	.04	.04	.05	.05

For Cold-Rolled Polished Bright Steel Shafting, see page 356.

For Tool Steel Drill Rods, see page 433.

ROTARY WIRE STRAIGHTENERS.

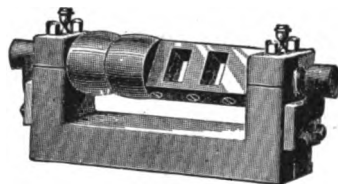


FIG. 1507.

3 DIE TIGHT & LOOSE PULLEYS.

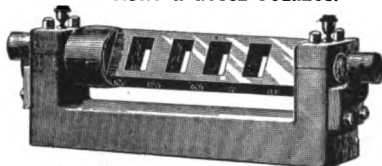


FIG. 1508. 5 DIE SINGLE PULLEY.

The above cuts represent different sizes and styles of Rotary Wire Straighteners, used in straightening Wire from 1/16 to 1/2 inch in diam. They are furnished with either 3 or 5 Dies, and Single or Tight and Loose Pulleys.

For Wire to 1/2, 5 Dies, Sing. Pulley,	\$15.50
" " " 3 " " "	16.65
" " " 3 " T. & L. "	18.85
" " " 5 " Sing. "	18.85
" " " 5 " T. & L. "	21.00

Mounted on Iron Pillar, \$6.65 extra.

PRICES—Continued from page 429.

For Wire to $\frac{1}{4}$, 3 Dies, Sing. Pulley, \$20.00	
" " " $\frac{1}{4}$, 3 " T. & L. "	23.25
" " " $\frac{1}{4}$, 5 " Sing. "	23.25
" " " $\frac{1}{4}$, 5 " T. & L. "	26.65

Mounted on Iron Pillar, \$7.75 extra.

For Wire to $\frac{1}{8}$, 3 Dies, Sing. Pulley, \$23.25	
" " " $\frac{1}{8}$, 3 " T. & L. "	26.65
" " " $\frac{1}{8}$, 5 " Sing. "	26.65
" " " $\frac{1}{8}$, 5 " T. & L. "	31.00

Mounted on Iron Pillar, \$9.00 extra.

For Wire to $\frac{1}{2}$, 3 Dies, Sing. Pulley, \$26.65	
" " " $\frac{1}{2}$, 3 " T. & L. "	31.00
" " " $\frac{1}{2}$, 5 " Sing. "	31.00
" " " $\frac{1}{2}$, 5 " T. & L. "	35.50

Mounted on Iron Pillar, \$11.00 extra.

For Wire to $\frac{1}{2}$, 3 Dies, Sing. Pulley, \$38.75	
" " " $\frac{1}{2}$, 3 " T. & L. "	46.50
" " " $\frac{1}{2}$, 5 " Sing. "	46.50
" " " $\frac{1}{2}$, 5 " T. & L. "	54.50

Mounted on Iron Pillar, \$16.65 extra.



FIG. 1509.

COMBINED HAND AND POWER WIRE STRAIGHTENING AND CUTTING MACHINE.

This machine is for straightening wire and cutting it into short lengths, or into long lengths that are to be cut again. When the lengths to be cut and size of wire is such that it will not spring or drop out of line, it can be cut accurately by means of the gauge. Where long lengths are desired to be cut, it can be used to good advantage in connection with a trough.

For working wire of

$\frac{1}{4}$ in. and smaller diameter, \$72.00	
$\frac{1}{8}$ " " " " 83.25	
$\frac{1}{2}$ " " " " 94.50	
$\frac{3}{4}$ " " " " 133.00	
1 " " " " 238.75	

In ordering Wire Straighteners, please state the size and kind of wire used.

We can also furnish, when desired, Roll, Oscillating, and Automatic machines.

HAND WIRE CUTTER.



This machine is offered as a practical and serviceable tool for cutting up wire or rod that has been previously straightened. It is not a toy like many of the so-called hand wire-cutters on the market, but a strong, well-made machine calculated to meet the wants of those who occasionally desire to cut up a small quantity of wire, or for use in small shops where the work is largely done by hand power.

One-quarter in. size cuts wire $\frac{1}{4}$ inch and smaller, FIG. 1510. \$24.00; $\frac{1}{2}$ in. size cuts wire $\frac{1}{2}$ inch and smaller, \$30.00.

ROTARY WIRE CUTTER.

This machine is run by belt power, and is designed for cutting wire into short pieces, such as rivets used in the manufacture of cutlery and kindred articles. There is no straightener attached to this machine, for where wire is cut in such short lengths, the natural curve is almost imperceptible, and straightening the wire is, therefore, unnecessary.



This machine will cut wire of $\frac{1}{4}$ inch and smaller diameter into lengths of 1 inch and shorter, at the rate of 600 lengths per minute.

Price, with one set of Feeding Rolls, \$70.00; Countershaft, \$18.00.

The Rotary Wire-Cutter is built only as ordered. We do not keep them in stock.

PLEASE DO NOT CUT OR TEAR out any pages or parts of pages from this Catalogue, as it partially destroys the book for future reference.

SPRING KEYS AND COTTERS.

We carry in stock all sizes given in list; can furnish to order smaller, larger, and intermediate sizes. Prices upon application stating quantity.

The length measurements given are from point to neck, or under eye.

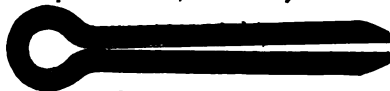


FIG. 1512. SPRING COTTER.

Size.	Per 1000.	Per 100.	Per Doz.	Size.	Per 1000.	Per 100.	Per Doz.
$\frac{1}{8}$ " x $\frac{1}{2}$ "	\$1.20	.20	.03	$\frac{1}{4}$ " x 2	\$3.80	\$.50	.09
$\frac{1}{8}$ " x $\frac{3}{4}$ "	1.40	.20	.03	$\frac{1}{4}$ " x $2\frac{1}{2}$	4.60	.55	.10
$\frac{1}{8}$ " x 1	1.60	.20	.04	$\frac{1}{4}$ " x 1	3.20	.40	.07
$\frac{1}{8}$ " x $1\frac{1}{2}$	1.70	.20	.04	$\frac{1}{4}$ " x $1\frac{1}{2}$	3.60	.45	.08
$\frac{1}{8}$ " x $\frac{3}{4}$ "	1.50	.20	.03	$\frac{1}{4}$ " x 1	4.00	.50	.09
$\frac{1}{8}$ " x 1	1.70	.20	.04	$\frac{1}{4}$ " x 2	4.90	.60	.10
$\frac{1}{8}$ " x $1\frac{1}{2}$	1.90	.25	.05	$\frac{1}{4}$ " x $1\frac{1}{2}$	4.40	.55	.10
$\frac{1}{8}$ " x $1\frac{3}{4}$	2.10	.30	.06	$\frac{1}{4}$ " x 1	4.80	.60	.10
$\frac{1}{8}$ " x 1	1.60	.20	.04	$\frac{1}{4}$ " x $1\frac{1}{2}$	5.30	.65	.10
$\frac{1}{8}$ " x 1	1.80	.23	.05	$\frac{1}{4}$ " x 2	5.80	.70	.12
$\frac{1}{8}$ " x $1\frac{1}{2}$	2.00	.25	.05	$\frac{1}{4}$ " x $2\frac{1}{2}$	7.00	.85	.15
$\frac{1}{8}$ " x $1\frac{3}{4}$	2.20	.30	.06	$\frac{1}{4}$ " x 1	6.60	.80	.13
$\frac{1}{8}$ " x $\frac{3}{4}$ "	1.80	.23	.05	$\frac{1}{4}$ " x 2	7.80	.95	.18
$\frac{1}{8}$ " x 1	2.00	.25	.05	$\frac{1}{4}$ " x $2\frac{1}{2}$	9.00	1.15	.20
$\frac{1}{8}$ " x $1\frac{1}{2}$	2.20	.30	.06	$\frac{1}{4}$ " x 3	10.60	1.35	.22
$\frac{1}{8}$ " x $1\frac{3}{4}$	2.50	.35	.06	$\frac{1}{4}$ " x $2\frac{1}{2}$	12.85	1.60	.28
$\frac{1}{8}$ " x 1	2.40	.30	.07	$\frac{1}{4}$ " x 3	14.40	1.80	.30
$\frac{1}{8}$ " x $1\frac{1}{2}$	2.80	.35	.07	$\frac{1}{4}$ " x $3\frac{1}{2}$	16.25	2.00	.35
$\frac{1}{8}$ " x $1\frac{3}{4}$	3.10	.40	.07	$\frac{1}{4}$ " x 4	18.25	2.25	.40
$\frac{1}{8}$ " x $1\frac{3}{4}$	3.50	.45	.08				

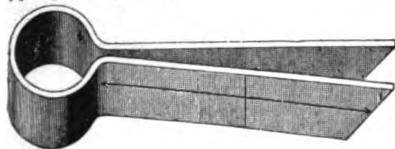


FIG. 1513. FLAT KEY.

Width.	Length.	Per 1000.	Per 100.	Per Doz.
$\frac{1}{8}$ "	1 $\frac{1}{2}$ "	\$4.50	\$0.55	\$0.10
$\frac{1}{8}$ "	2	5.50	.65	.12
$\frac{1}{8}$ "	1 $\frac{1}{2}$ "	6.50	.80	.15
$\frac{1}{8}$ "	2	7.50	.95	.18
$\frac{1}{8}$ "	2 $\frac{1}{2}$ "	8.50	1.05	.20
$\frac{1}{8}$ "	2	8.00	1.00	.19
$\frac{1}{8}$ "	2 $\frac{1}{2}$ "	9.50	1.20	.22
$\frac{1}{8}$ "	3	11.00	1.40	.25

MACHINE KEYS.

We can furnish to order Drop-forged Machine Keys in the rough, and expect before long to have a complete line of Finished, Flat and Taper Keys.

For machine shops and manufacturers who use large numbers of Keys, we consider what is known as the "Woodruff System" as being, by all odds, the most convenient and economical method of accomplishing this work.

Will be pleased to send circulars and further information upon application.



FIG. 1514.

EXTENSION OR "CLOSE" SPRING.



FIG. 1515.

COMPRESSION OR "OPEN" SPRING.

The Coil Springs which we carry in stock are made of steel wire *oil-tempered*. We formerly sold Springs made of brass and Bessemer steel spring wire, but the brass spring wire deteriorates with exposure to the atmosphere, and the coppered spring wire is uncertain as to quality. The sizes, as given in table, are outside diameter, and the Springs are made of wire that is, approximately, one-eighth of the outside diameter of the Spring.

Diameter.	6 inch. Close.	12 inch. Close.	6 inch. Open.	12 inch. Open.
$\frac{1}{8}$ "	\$0.08	\$0.13	\$0.06	\$0.09
$\frac{1}{4}$ "	.10	.15	.08	.10
$\frac{3}{8}$ "	.11	.16	.07	.12
$\frac{1}{2}$ "	.12	.18	.08	.14
$\frac{5}{8}$ "	.13	.22	.09	.15
$\frac{3}{4}$ "	.15	.25	.12	.18
$\frac{7}{8}$ "	.18	.30	.14	.20
1"	.25	.40	.20	.35
1 $\frac{1}{2}$ "	.30	.50	.25	.40
1 $\frac{1}{2}$ "	.60	1.00	.50	.80
1 $\frac{1}{2}$ "	.70	1.25	.60	1.00

We can furnish Springs of any style or shape, to order, in *quantities*, and will be pleased to name prices upon receipt of sketch, with full description.

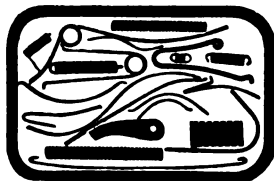


FIG. 1516.

WEIGHT OF WIRE AND PLATES BY AMERICAN (OR B. & S.) GAUGE.

No. of Gauge	Dec. Size. Inch.	WEIGHT OF WIRE PER 1000 LINEAL FEET.				WEIGHT OF PLATES PER SQUARE FT.			
		Iron. Lbs.	Steel. Lbs.	Copper. Lbs.	Brass. Lbs.	Iron. Lbs.	Steel. Lbs.	Copper. Lbs.	Brass. Lbs.
00	.32486	279.67	282.30	319.45	301.82	12.1823	12.3447	14.716	13.904
1	.28930	221.79	223.89	253.34	239.35	10.8488	10.9934	13.105	12.382
2	.25763	175.89	177.55	200.91	189.82	9.6611	9.7899	11.671	11.027
3	.22942	139.48	140.80	159.32	150.52	8.6033	8.7180	10.393	9.8192
4	.20431	110.82	111.66	126.35	119.38	7.6616	7.7639	9.2552	8.7445
5	.18194	87.720	88.548	100.20	94.606	6.8228	6.9137	8.2419	7.787
6	.16202	69.565	70.221	79.462	75.075	6.0758	6.1568	7.3395	6.9345
7	.14428	55.165	55.685	63.013	59.545	5.4105	5.4826	6.5359	6.1752
8	.12849	43.751	44.164	49.976	47.219	4.8184	4.8826	5.8206	5.4994
9	.11443	34.699	35.026	39.636	37.437	4.2911	4.3483	5.1837	4.8976
10	.10189	27.512	27.722	31.426	29.687	3.8209	3.8718	4.6156	4.3609
11	.09074	21.820	22.026	24.924	23.549	3.4028	3.4482	4.1106	3.8833
12	.08080	17.304	17.468	19.766	18.676	3.0303	3.0707	3.6606	3.4586
13	.07196	13.722	13.851	15.674	14.809	2.6985	2.7345	3.2598	3.0799
14	.06408	10.586	10.689	12.435	11.746	2.4032	2.4352	2.9030	2.7428
15	.05706	8.631	8.712	9.859	9.315	2.1401	2.1686	2.5852	2.4425
16	.05082	6.845	6.909	7.819	7.587	1.9058	1.9312	2.3021	2.1751
17	.04525	5.427	5.478	6.199	5.857	1.6971	1.7198	2.0501	1.937
18	.04030	4.304	4.344	4.916	4.645	1.5114	1.5315	1.8257	1.726
19	.03589	3.413	3.445	3.899	3.684	1.3459	1.3638	1.6258	1.5361
20	.03196	2.708	2.734	3.094	2.920	1.1985	1.2145	1.4478	1.3679
21	.02846	2.147	2.167	2.452	2.317	1.0673	1.0816	1.2893	1.2182
22	.02534	1.703	1.719	1.945	1.838	.9505	.9631	1.1482	1.0849
23	.02257	1.350	1.363	1.542	1.457	.8464	.8577	1.0225	.9680
24	.02010	1.071	1.081	1.223	1.155	.7537	.7638	.9105	.8602
25	.01790	.8191	.8251	.9699	.9163	.6712	.6802	.8108	.7661
26	.01594	.6734	.6797	.7692	.7267	.5977	.6057	.7220	.6822
27	.01419	.5340	.5391	.6099	.5763	.5323	.5394	.6430	.6075
28	.01264	.4235	.4275	.4837	.4570	.4740	.4803	.5726	.5410
32	.00795	.1675	.1691	.1913	.1808	.2981	.3021	.3601	.3402
34	.00630	.1053	.1063	.1204	.1137	.2364	.2395	.2855	.2698
36	.00500	.0662	.0668	.0757	.0715	.1875	.19	.2265	.2140
38	.00396	.0416	.0420	.0475	.0449	.1486	.1506	.1796	.1697
40	.00314	.0262	.0264	.0299	.0282	.1179	.1194	.1424	.1345

These Weights are theoretically correct, but variations must be expected in practice.

WEIGHTS, SPECIFIC GRAVITY AND MELTING POINTS OF VARIOUS METALS.

	Wt per Cub. Inch.	Specific Gravity.	Melting Points.		Wt per Cub. Inch.	Specific Gravity.	Melting Points.
Aluminum Ingot,	.0926	2.56	1400°	Iron, Cast,	.2555	7.065	2250°
" Bronze,	.2785	7.7		" Wire,	.2811	7.774	
Antimony,	.2428	6.712	810°	" Plates,	.2787	7.704	
Arsenic,	.2084	5.763	365°	" Wrought,	.2817	7.788	2822°
Bismuth,	.3553	9.823	476°	Lead, Cast,	.4106	11.352	608°
Brass, Hard Sheet,	.3056	8.45		" Sheet,	.4119	11.368	
" Soft,	.2997	8.3		Manganese,	.2894	8.	
" Plate,	.3026	8.38		Mercury, 60°	.4908	13.569	39°
" Cast,	.293	8.1		Nickel,	.3183	8.8	
" Wire,	.2972	8.214		Platinum, Sheet,	.7982	22.069	3080°
Bronze Tobin,	.3021	8.379		Silver, Cast, Pure,	.3788	10.474	
" Gun Metal,	.3165	8.76	1692°	Steel Plates,	.2823	7.806	2500°
Cobalt,	.3111	8.6		" Wire,	.2838	7.847	
Copper Plates,	.3146	8.698		" Cast,	.2839	7.848	2462°
" Wire,	.3212	8.88		" Bessemer,	.284	7.852	
" Ingot,	.3113	8.608	1996°	Tin Cornish, Pure,	.2637	7.291	446°
Gold, Cast, Pure,	.6965	19.258	2590°	Zinc,	.2482	6.861	680°

DRILL RODS.

FIG. 1518.

We sell the "Crescent Special" Polished Compressed Drill Rod. As regards quality of steel, we believe these are equal to the Stubs' or any of the imported Rods; and for finish, accuracy, and uniformity of sizes, they excel all others. Every shop should have a small assortment of these Rods on hand, as they are very convenient for a thousand and one useful purposes, such as the making of Taps, Drills,

Punches, Rollers, Pins, Shafts and Rods for marble work, and a variety of purposes where accuracy and good workmanship are required.

Other sizes than those listed here can be furnished to order, but not in small quantities.

We can also furnish Square, Hexagon, and Triangular Rods, and carry in stock a number of sizes in the Square form. There is a growing demand for these Rods furnished in special sizes and shapes, for Punches and similar work.

We carry these Rods in stock in lengths of 12 and 36 inches, and do not cut lengths.

No.	Diam.	Lb.	Foot.	No.	Diam.	Lb.	Foot.	No.	Diam.	Lb.	Foot.	No.	Diam.	Lb.	Foot.
80	.013	\$4.05	2c	46	.079	\$0.79	3c	13	.182	\$0.56	9c	Q	.332	\$0.50	\$0.25
79	.014	3.83	2	45	.081	.79	3	12	.185	.56	9	R	.339	.56	.25
78	.015	3.60	2	44	.085	.79	3		3-16—	.1875			11-32—	.3437	
	1-64—	.0156		43	.088	.79	3	11	.188	.56	9	S	.348	.56	.27
77	.016	3.38	2	42	.092	.79	4	10	.191	.56	10	T	.358	.56	.28
76	.018	3.15	2		3-32—	.0937		9	.194	.56	10		23-64—	.3593	
75	.020	3.04	2	41	.095	.79	4	8	.197	.56	10	U	.368	.56	.30
74	.022	2.93	2	40	.097	.79	4	7	.199	.56	10		3-8—	.375	
73	.023	2.70	2	39	.099	.79	4	6	.201	.56	10	V	.377	.56	.32
72	.024	2.70	2	38	.101	.68	4		13-64—	.2031		W	.386	.56	.34
71	.026	2.70	2	37	.103	.68	4	5	.204	.56	10		25-64—	.3906	
70	.027	2.48	2	36	.106	.68	4	4	.207	.56	12	X	.397	.56	.36
69	.029	2.48	2	35	.108	.68	4	3	.212	.56	12	Y	.404	.56	.36
68	.030	2.25	2		7-64—	.1093			7-32—	.2187			13-32—	.4082	
67	.031	2.25	2	34	.110	.68	4	2	.219	.56	12	Z	.413	.56	.38
	1-32—	.0312		33	.112	.68	4	1	.227	.56	12		27-64—	.4218	
66	.032	2.25	2	32	.115	.68	5	A	.234	.56	13	T	.4375	.45	.40
65	.033	2.03	2	31	.120	.68	5		15-64—	.2343			29-64—	.4531	
64	.035	2.03	2		1-8—	.125		B	.238	.56	13	‡	.4687	.45	.45
63	.036	2.03	2	30	.127	.62	5	C	.242	.56	13		31-64—	.4843	
62	.037	1.80	2	29	.134	.62	6	D	.246	.56	14	‡	.500	.45	.50
61	.038	1.80	2	28	.139	.62	6		1-4—	.250		‡	.5312	.41	.50
60	.039	1.58	2		9-64—	.1406		E	.250	.56	14	‡	.5625	.41	.55
59	.040	1.58	2	27	.143	.62	7	F	.257	.56	15	‡	.5937	.41	.55
58	.041	1.58	2	26	.146	.62	7	G	.261	.56	15	‡	.625	.41	.60
57	.042	1.35	2	25	.148	.62	7		17-64—	.2656		‡	.6562	.41	.65
56	.045	1.35	2	24	.151	.62	7	H	.266	.56	16	‡	.6875	.41	.70
	3-64—	.0468		23	.153	.62	7	I	.272	.56	18	‡	.7187	.41	.75
55	.050	1.35	2	22	.155	.62	8	J	.277	.56	18	‡	.750	.41	.80
54	.055	1.09	3		5-32—	.1562		K	.281	.56	18	‡	.7812	.38	.85
53	.058	1.09	3	21	.157	.62	8		9-32—	.2812		‡	.8125	.38	.90
	1-16—	.0625		20	.161	.62	8	L	.290	.56	20	‡	.8437	.38	.95
52	.063	1.09	3	19	.164	.62	8	M	.295	.56	20	‡	.875	.38	1.00
51	.066	1.09	3	18	.168	.62	8		19-64—	.2968		‡	.9062	.38	1.05
50	.069	.90	3		11-64—	.1718		N	.302	.56	20	‡	.9375	.38	1.10
49	.072	.90	3	17	.172	.62	9		5-16—	.3125		‡	.9687	.38	1.20
48	.075	.90	3	16	.175	.62	9	O	.316	.56	22	‡	1	.38	1.25
47	.077	.90	3	15	.178	.56	9	P	.323	.56	24	1‡	1.0625	.38	1.45
	5-64—	.0781		14	.180	.56	9		21-64—	.3281		1‡	1.0625	.38	1.65

TOOL STEEL.

We might fill several pages discussing the relative merits of American and English Tool Steel, but we haven't the room in the first place, and in the second place, well posted men differ so radically in their opinions that discussions of this kind usually amount to little.

We have sold both English and American Steel for many years, and, while for many uses the American Steel is generally conceded to be equal to any, it has been our experience that for all-around purposes, the better grades of English Tool Steel are preferable.

There are many well-known brands of English Tool Steel, and we do not think there is much difference between any of the leading makes. The makes best known in this country are the Jessop, Eirth, Hobson, Wardlow, and Dannemora.

We handle the last named Steel, made by Seebohm & Dieckstahl, Sheffield, England, and believe it to be quite equal to any Steel now made.

A very important feature in the use of Tool Steel must not be overlooked, and that is, in the majority of cases the cost of labor is usually many times the cost of Steel. It is, therefore, very poor economy to save a few cents per lb. on Steel, and run the risk of a finished tool or article turning out badly on this account. Of course, unwise economy may be practiced in this, as in other things, as there are many heavy tools that are practically as good made of 6-cent as of 18-cent Steel.

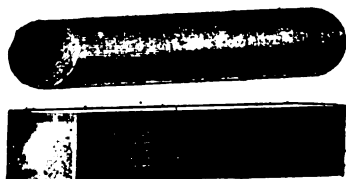


FIG. 1519.

AS TO PRICE—The Dannemora Steel is sold at about the same prices as the other makes named above. We have printed here a price list of this Steel by the foot, which will be found a convenient method for those using small quantities. Will name prices by the lb. when desired.

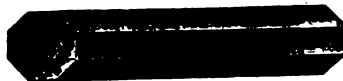


FIG. 1520.

PRICE LIST ROUND, SQUARE AND OCTAGON TOOL STEEL.

Diam.				Diam.			
In.	Rd.	Sq.	Oct.	In.	Rd.	Sq.	Oct.
$\frac{1}{8}$	\$0.05	\$0.05	\$0.05	$\frac{3}{4}$	\$0.30	\$0.40	\$0.35
$\frac{3}{16}$	.05	.05	.05	$\frac{7}{8}$	.40	.55	.50
$\frac{1}{4}$	.05	.05	.05	1	.55	.70	.60
$\frac{5}{16}$	.07	.07	.07	$1\frac{1}{8}$	.70	.85	.75
$\frac{3}{8}$	.08	.08	.08	$1\frac{1}{4}$	.85	1.10	.90
$\frac{7}{16}$	.10	.10	.10	$1\frac{3}{8}$	1.00	1.40	1.15
$\frac{1}{2}$	.12	.13	.13	$1\frac{1}{2}$	1.20	1.65	1.40
$\frac{5}{8}$	.14	.17	.15	$1\frac{3}{4}$	2.10	2.20	1.90
$\frac{3}{4}$	.15	.20	.18	2	2.25	3.00	1.50
$\frac{7}{8}$	.20	.30	.25				



FIG. 1521.

FLAT—PRICE PER FOOT.

WIDTH IN INCHES.

Thick In.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
$\frac{1}{8}$	\$0.05	\$0.05	\$0.05	\$0.06	\$0.07	\$0.10
$\frac{1}{4}$	.05	.06	.07	.10	.12	.15
$\frac{3}{8}$			.10	.12	.14	.15
$\frac{1}{2}$			.15		.18	.20
$\frac{3}{4}$					.20	.25
$\frac{7}{8}$						.28

WIDTH IN INCHES.

Thick In.	$\frac{1}{8}$	$\frac{1}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$\frac{1}{8}$	\$0.12	\$0.13	\$0.14	\$0.15	\$0.16	\$0.20
$\frac{1}{4}$	.16	.18	.20	.22	.25	.30
$\frac{3}{8}$	.18	.24	.28	.32	.35	.40
$\frac{1}{2}$	.25	.30	.34	.37	.40	.45
$\frac{3}{4}$	.30	.35	.38	.42	.45	.50
$\frac{7}{8}$	.32	.38	.40	.45	.50	.55
$\frac{1}{2}$	.40	.45	.55	.60	.70	.85
$\frac{3}{4}$		.60	.70	.75	.85	1.00

WIDTH IN INCHES.

Thick In.	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
$\frac{1}{8}$	\$0.25	\$0.30	\$0.35	\$0.40	\$0.48	\$0.55
$\frac{1}{4}$	.35	.40	.50	.60	.70	.80
$\frac{3}{8}$	.45	.50	.55	.60	.85	1.00
$\frac{1}{2}$	.60	.55	.60	.65	.95	1.10
$\frac{3}{4}$	.55	.60	.65	.70	1.05	1.25
$\frac{7}{8}$	.65	.75	.90	1.05	1.20	1.30
$\frac{1}{2}$	.90	1.10	1.40	1.65	1.80	2.00
$\frac{3}{4}$	1.90	1.40	1.70	2.10	2.30	2.70

SHEET STEEL.

The subject of Sheet Steel is a very complex one. It is made in all grades, both Hot and Cold-rolled, in an endless variety of Tempers, and ranging in price from 3 or 4 cents per lb., for the common article, up to as high as \$1.00 (or even more for the very thin sizes) for the fine imported steel known as Watch Main-spring Steel.

We carry in stock three grades. The first is a good Spring Steel quality; the next, a good Tool Steel quality; and third is the imported Watch-spring stock mentioned above, and is the finest grade of Sheet Steel that can be produced.

We can furnish other grades, and will be pleased to supply any information that lies in our power.

CIRCULAR SAW PLATES.

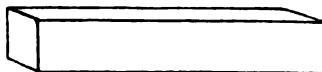
These Plates, as the name implies, are round blanks of steel intended for use in the manufacture of Saws, although their use will be suggested for a great variety of other purposes. We can furnish these in all sizes, but carry in stock only the sizes in list. The thickness is gauged by the English Gauge.

Gauge.	8	9	10	11	12	14
10 in.			\$0.65		\$0.60	\$0.50
12 "			1.00		.90	.75
14 "			1.40	\$1.30	1.20	.80
16 "	\$2.20	\$2.00	1.80	1.65	1.45	1.20
18 "	2.85		2.35	2.10	1.90	1.50
20 "	3.35	3.15	2.80	2.50	2.30	
24 "		4.50	4.10	3.65		
28 "	6.80	6.25	5.55			
30 "	7.80	7.10	6.50			
36 "	11.40	10.30				

"AIR" OR "SELF-HARDENING" STEEL.

This refers to a Steel that is not tempered in the usual way, but is brought up to a moderate heat—about cherry-red,—worked at that temperature, and then left to cool. It is used largely for turning and drilling tools, and it is claimed that for working in hard materials, it is vastly superior to any known Tool Steel.

The best known Steel of this class is "Mushets," although there are a number of other makes. The demand for this Steel is constantly increasing. We carry in stock a limited number of sizes, and will furnish prices and further information upon application.

**SQUARE AND FLAT COLD-ROLLED STEEL.**

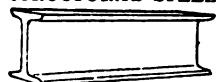
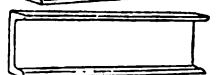
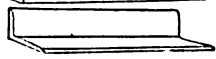
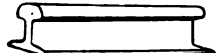
This Steel is of the same grade, and is made practically under the same processes as the Cold-rolled Steel shafting (see page 356). It is an article that would be used to a much greater extent were it not for the fact that manufacturers and mechanics know so little of it. It has a smooth, bright finish; is true to size within .002 or .003 of an inch. The edges are sharp, and it will in many instances take the place of planed stock.

We carry on hand Square Steel, as per list below, and can furnish sizes up to 4 inch. On sizes 2½ inch and larger, the corners are slightly rounded.

In the Flat Cold-rolled Steel, we carry but few sizes in stock or at the mill, but can furnish quite a number of sizes to order (in quantities, however, of not less than 100 lbs. of a size).

PRICE LIST SQUARE COLD-ROLLED STEEL.

Size.	1	1½	2	2½	3	4
Per Ft.	\$0.05	.05	.05	.06	.07	.08
Size.	1	1½	2	2½	3	4
Per Ft.	\$0.11	.12	.14	.16	.18	.20
Size.	1	1½	2	2½	3	4
Per Ft.	\$0.24	.28	.28	.35	.40	.48

STRUCTURAL STEEL.**I BEAM.****CHANNEL.****ANGLE.****T RAIL.**

We can furnish to order (shipped from mills at Pittsburgh), I Beams, Channels, Tees, Equal and Unequal Leg Angles, T Rails, etc., etc.

Furnish Beams and Channels Punched, Framed, Riveted. Ends Reveled, etc.

We also have complete tables of minimum and maximum weights and dimensions of Structural Steel, and table giving capacity of safe loads. Will be pleased to supply any information.

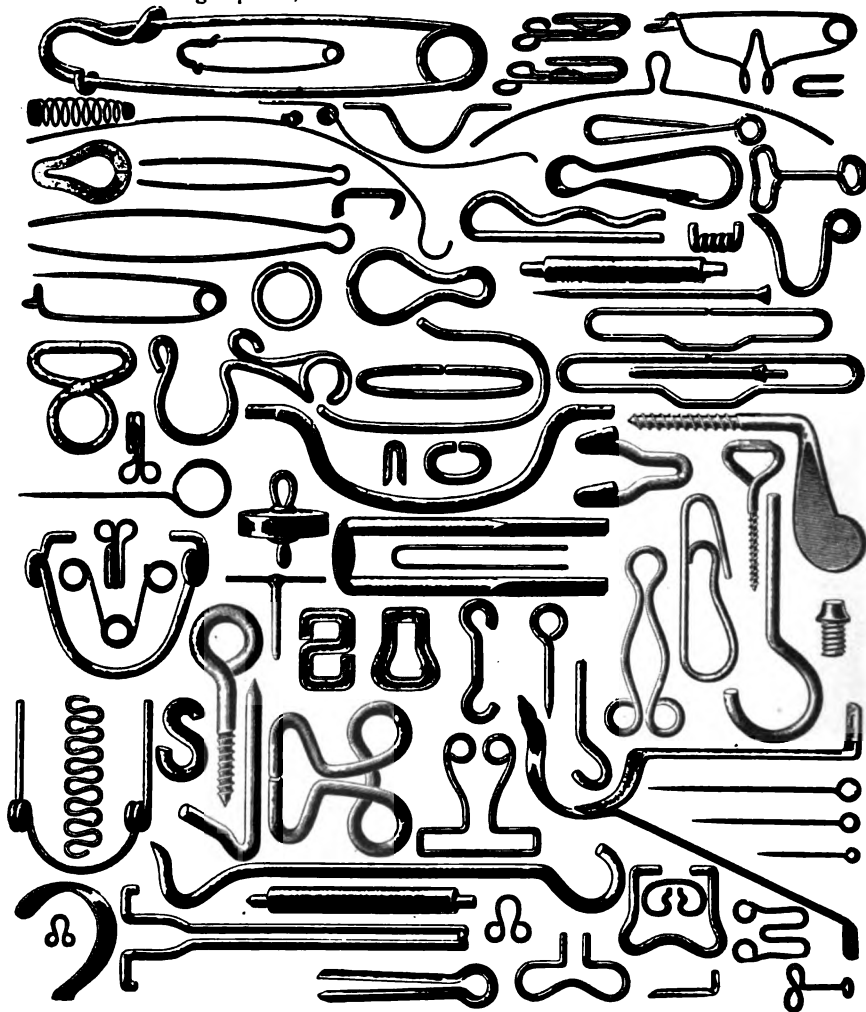
**SPECIMENS OF AUTOMATIC
MACHINE WORK.**

The illustration shows samples of work, for which we can furnish to order Automatic Machines that, in nearly every instance, take the wire direct from coil, and complete the articles at one operation.

When making inquiries, send a correct

sample of the work to be performed. In case this cannot be done, enclose sketch, and state size and temper of wire or metal to be used, and exact size or thickness in thousandths of an inch.

We can also furnish to order (in quantities) many articles similar to those shown here.



ANTI-FRICTION METALS.

For a number of years past, there has been a great tendency among Babbitt and Anti-Friction Metal manufacturers to increase their profits by putting out a low grade metal, giving it a fancy title, and, by "Circus-poster" advertising and constant drumming, getting a high price for it.

The composition of the standard mixtures of anti-friction metals are so generally known, that it is not easy for manufacturers to get more than a smelter's profit; and the manufacturers of these metals cannot afford to give a "Chronio" with every sale, and in fact rarely employ traveling men.

With the "Fancy-brand" manufacturer the case is quite different, and the "woods are full" of agents, selling the greatest and best Babbitt Metal on earth. They can well afford to spend a whole day's time on a hundred pound order, as they usually get from 18 to 30 cents per lb. for metal that costs them from 5 to 8 cents per lb. to make.

For the last two or three years, there has been a "Kilkenny Cat" fight between several of the leading fancy brand Anti-friction Metal manufacturers. "When thieves fall out, honest men get their dues." One of the results of the fight has been to expose quite thoroughly the different compositions of the various alloys, and here are some of them:

No. 1.	No. 2.	No. 3.
Lead, 78.27	Lead, 76.14	Zinc, 92.
Antim. 16.	Antim. 17.82	Cop'r, 3.
Tin, 5.73	Tin, 6.04	Tin, 5.
No. 4.	No. 5.	No. 6.
Lead, 79.11	Lead, 80.	Zinc, 81.46
Antim. 15.73	Antim. 16.	Cop'r, 1.25
Tin, 3.64	Tin, 4.	Tin, 15.71
Iron, 1.52		Lead, 1.58

The actual cost of the above alloys runs from 5 to 8 cents per lb., and they are sold at prices ranging from 14 to as high as 30 cents per lb.

OUR METALS.

The combination of Lead, Antimony, Tin and Copper has proved to be the best for Anti-friction purposes; and all the difference in price should arise from the greater or less quantity of tin used, that being the most costly ingredient.

We carry in stock five grades of Babbitt Metal, and these metals are simply standard mixtures; can be depended upon for

[23]

uniformity, only the best of material being used, and the quality fitting price.

The lower-priced Metals all have their proper uses, and there are many places where a high-priced Metal is unnecessary and extravagant. For general purposes our "C," "D" and even the "E" brand will prove acceptable.



FIG. 1332.

"A" GENUINE BABBITT. Per lb., \$0.30.

In comparing prices of Genuine Babbitt with other metals, one important fact must be borne in mind: Genuine Babbitt being composed largely of tin, has less specific gravity, and a job that would require 25 lbs. of Genuine would take from 30 to 35 lbs. of the cheaper grades, which are composed largely of lead.

We sell more of our "A" brand Genuine Babbitt than any other. The formula of this is: Tin, 88 parts; Copper, 4 parts; Antimony, 8 parts. This when made properly and of the best stock, viz: Lake Copper, Cookson's Antimony, and Banca Tin, surpasses anything else that can be made as an Anti-friction Metal.

This Metal will run for years at 10,000 speed and 1,000 tons pressure.

"B" BABBITT.

This Metal has less Tin than the Genuine and contains a percentage of lead. Price, per lb., \$0.22.

"C" BABBITT.

The "C" Babbitt will be found superior to most of the fancy brands, and is suitable for general purposes. Per lb., \$0.14.

"D" BABBITT.

This Metal is fully equal to most of the so-called "Best on earth" Babbitt Metals, and can be used to good advantage for light and medium work, running at fair speed. Price, per lb., \$0.11.

"E" BABBITT.

This is equal to brands usually sold in hardware stores; it is composed of Lead, with a small percentage of Antimony added. Price, per lb., \$0.06½.

SPECIAL NOTICE.

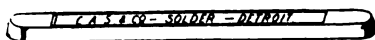
In order to get the best results, Babbitt Metal should be thoroughly stirred before pouring. The metals composing Babbitt being of different gravities, it is necessary that it should be well mixed.

you get just what you pay for.

SOLDER.

For general purposes the best Solder is that composed of 51 parts of tin and 49 parts lead. The Solder that is generally sold by hardware dealers is what is known as "Half and Half," and the name is misleading, for at least 90 per cent of it is composed of not more than 45 parts of tin to 55 of lead. We have tested some brands, and find that they contain but 40 parts of tin, the balance being lead. For plumbers' use and some few other purposes, a Solder composed of 40 parts tin and 60 parts lead, answers very well.

We sell but the one quality, and we will guarantee all of our Solder to contain not less than 50 per cent of tin.

**FIG. 1523. BAR SOLDER.**

The Bars are about $\frac{1}{2}$ in. wide, $\frac{1}{4}$ in. thick, 13 in. long, and weigh about $1\frac{1}{2}$ lbs. Price, per lb., \$0.18.

**FIG. 1524. TRIANGULAR SOLDER**

Size about $\frac{1}{4}$ in. x 15 in. long. Bars weigh about 5 oz. Price, per lb., \$0.20.

**FIG. 1525. WIRE SOLDER**

We can furnish this in different diameters, but carry in stock but one size, $\frac{1}{8}$ in. Price, per lb., \$0.22.

The above named prices on Solder are for small quantities. Special prices will be given upon application, stating quantity

**FIG. 1526 SOLDERING COPPER.**

No.	1	1 $\frac{1}{2}$	2	3	4	5	6
Wght., $\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2
Each, \$0.25	.25	.30	.45	.60	.85	1.15	1.45

The above cut shows what is known as the Pointed Pattern, this being a most commonly used style. We can furnish to order Flat, Roofing, and Hatchet patterns

ELLIOTT'S SOLDERING FLUID

This is a non-corrosive fluid, and takes the place of the muriatic acid solution ordinarily used in soft soldering. It is recommended by the best concerns in the country. We carry it in 1 and 4 oz. bot

tles; price, \$0.15 and \$0.30 Can furnish it in larger packages at a proportionately less price.

BUTTLE'S CHARCOAL FIRE POT.**FIG. 1527.**

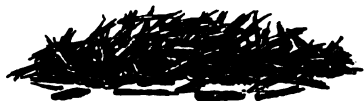
The Buttle's Charcoal Fire-pot, as shown in Fig. 1527, is the most popular one with tinmiths. These Fire-pots are nicely Japanned.

Price, each, complete, \$2.25.

FOR GASOLINE FIRE POTS, see page 406.

BRAZING SPELTER.

This is often times known as Hard Solder. It is used extensively by bicycle manufacturers, machine shops, copper-smiths, and model makers, for brazing or soldering steel, iron, copper, etc. There

**FIG. 1528 ROUND GRAIN SPELTER****FIG. 1529 LONG GRAIN SPELTER.**

are two varieties: The Round Grain, Fig. 1528, and the Long Grain, Fig. 1529. The Round Grain is quick running and is the most commonly used for general purposes. We sell 10 lbs. of this to one of the other. The Long Grain is harder, and is used more especially for large and heavy work.

We have three grades of the Round Grain: Fine, Medium and Coarse. Fig. 1528 shows the Medium. Price, per lb., Fine, \$0.32; Medium, \$0.28; Coarse, \$0.25 Long Grain. " " 28; " " .25

Special prices in lots of 10 lbs. or more

SILVER SOLDER.

We sell Silver Solder principally for use in Brazing or welding Band Saws, and it is also used where a nice, strong joint is required. Price, per oz. \$1.35; $\frac{1}{2}$ oz. \$0.75.



FIG. 1530. BAR TIN.

We have the pure Bar Tin in bars $\frac{3}{4}$ in. thick, $1\frac{1}{4}$ in. wide, and 13 in. long, weighing about one lb. to the bar. Price, per lb., \$0.28. Special price on quantities and on Tin in pigs.

ANTIMONY.

There are two well known brands; Cookson's and Hallet's. The Cookson Antimony is considered superior to any other, and usually sells from $1\frac{1}{4}$ to $2\frac{1}{4}$ cts. higher. We carry in stock nothing but the Cookson, which we sell in small quantities at \$0.18 per lb.. Prices on quantities of either brand will be named upon application.

ZINC.

We carry in stock Zinc in slabs about 10x16 in. and $1\frac{1}{4}$ in. thick. The price is constantly changing, but the ordinary retail price in small quantities is about 8 cents per lb.

Sheet and Bar Zinc, Tubing, etc., we do not carry in stock. We know a little something, however, about these goods, and will be pleased to impart what information we have.

SHEET LEAD.

We can furnish Sheet Lead weighing per square ft. from $3\frac{1}{4}$ to 10 lbs. Sheet Lead $\frac{1}{4}$ inch thick weighs about 4 lbs. per square ft.; $\frac{1}{2}$ inch thick, 15 lbs. per square ft. Prices will be given upon application stating quantity.

ALUMINUM.

There are many misconceptions about Aluminum that are widespread, and which seem difficult to correct in the public mind, educated as it has been, largely through newspapers.

We read an article a short time ago which stated that Aluminum was twice as strong as steel, and that before long it would take its place in bridge and ship-building; that it would soon be furnished cheaper than steel, and a lot of other similar rot. Only a day or two since, one of our local papers printed a lot of stuff, in which it was gravely stated that Aluminum weighed but one lb. to the cubic foot (the actual weight is $169\frac{1}{4}$ lbs.).

Aluminum is now extensively used for kitchen and table-ware, military equipments, boat trimmings, horse-shoes, in-

struments and handles, models, and other purposes where lightness, good appearance and non-corrosive qualities are desirable.

Aluminum is very ductile, can be drawn into tubes or wire, and spun or stamped into different shapes. It is the lightest of the commercial metals, a given bulk of it being only one-third as heavy as iron. It melts at 1160 deg. Fah. The ordinary commercial Aluminum is about as hard as copper. Cast Aluminum has a tension about equal to cast iron in strength, but, under compression, is comparatively weak. The shrinkage of Aluminum in casting is $\frac{1}{4}$ ths of an inch to the foot; it is melted in ordinary plumbago crucibles, such as are used for melting brass, and the same general methods are pursued.

Aluminum is very difficult to solder, this being a great hindrance to its more general use. It is hoped that before long a simple means will be discovered to accomplish this work. Very many useful alloys can be made, the 5 to 10 per cent Aluminum Bronzes being among the finest and strongest alloys known. With exception of Lead, Antimony, and Mercury, it unites readily with metals.

Aluminum can be furnished in different grades of purity, and the price depends upon quality. We carry but one grade in stock, 99.25 pure, which at the present time we sell at the rate of \$1.20 per lb., and in small quantities at 10 cts. per oz. For many purposes the cheaper grades will be found quite as useful. Special prices will be named upon application stating quality and quantity. For price of Wire and Sheet, see pages 421-427

THE RARER METALS.

We have occasional inquiries from our customers regarding the Rarer Metals, of which there are some forty or fifty varieties, including Bismuth, Cobalt, Gallium, Germanium, Indium, Iridium, Palladium, Ruthenium, Uranium, etc., etc.

Arsenic is perhaps the cheapest of the so-called Rarer Metals, selling for about 15 to 18 cents per lb., Gallium the most expensive, being held at the rate of \$45,454 per lb. A leading New York house asks \$25.00 for a vial containing $1\frac{1}{4}$ grains, this being at the rate of over \$100,000 per lb. We handle but few of the Rarer Metals, but will be glad to impart to inquirers any information we possess concerning them.

SET AND CAP SCREWS.

FIG.
1531.

AS TO DIAMETER—Orders for Set and Cap Screws are filled with exact size.

AS TO THREADS—Orders are filled according to table of Threads found at head of price list. U. S. S. and other styles of threads furnished to order.

FIG. 1532.



Headless Set Screws take the same price as the Case-hardened Set Screws. We carry in stock quite a variety of sizes, all with Cup points.



AS TO POINTS—In Set Screws, Cup and Oval Points are regular; all other kinds are special and furnished to order.

AS TO STEEL SET SCREWS—We can furnish them when desired. They cost 25 per cent more than iron, and our experience is that they are not worth the difference.

Can furnish to order what are known as Flat, Button, Fillister and Round Head Cap Screws, milled from the solid bar; diam. from $\frac{1}{8}$ to 1 inch inclusive.



FIG. 1553. SQUARE HEAD CAP SCREW.



FIG. 1554. HEXAGON HEAD CAP SCREW.

PRICE LIST CASE HARDENED SET SCREWS.

Diam.	$\frac{1}{8}$ —20 Th'ds.			$\frac{1}{4}$ —18 Th'ds.			$\frac{3}{8}$ —16 Th'ds.			$\frac{1}{2}$ —14 Th'ds.			$\frac{3}{4}$ —12 Th'ds.			Diam.	
Length	Un. Hd.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	Length
$\frac{1}{8}$ to $\frac{1}{2}$		\$0.67	.10	.02	\$0.73	.11	.02	\$0.83	.13	.02	\$0.97	.15	.02	\$1.13	.18	.03	$\frac{1}{2}$ to $\frac{3}{4}$
1		.72	.11	.02	.78	.12	.02	.88	.13	.02	1.03	.15	.02	1.20	.18	.03	1
$1\frac{1}{8}$		.77	.12	.02	.83	.13	.02	.93	.14	.02	1.10	.16	.02	1.27	.19	.03	$1\frac{1}{8}$
$1\frac{1}{4}$		.82	.12	.02	.88	.13	.02	.98	.15	.02	1.17	.17	.02	1.33	.20	.03	$1\frac{1}{4}$
$1\frac{1}{2}$		.87	.13	.02	.93	.14	.02	1.03	.15	.02	1.23	.18	.03	1.40	.21	.03	$1\frac{1}{2}$
2		.93	.14	.02	1.00	.15	.02	1.10	.16	.02	1.32	.20	.03	1.48	.22	.03	2
$2\frac{1}{8}$					1.08	.16	.02	1.18	.17	.02	1.42	.21	.03	1.58	.23	.03	$2\frac{1}{8}$
$2\frac{1}{4}$								1.28	.19	.02	1.53	.23	.03	1.70	.25	.04	$2\frac{1}{4}$
$2\frac{1}{2}$											1.67	.25	.03	1.83	.27	.04	$2\frac{1}{2}$
3														1.98	.30	.04	3
$3\frac{1}{8}$														2.32	.35	.05	$3\frac{1}{8}$
4														2.65	.40	.05	4

Diam.	$\frac{1}{8}$ —12 Th'ds.			$\frac{1}{4}$ —11 Th'ds.			$\frac{3}{8}$ —10 Th'ds.			$\frac{1}{2}$ —9 Th'ds.			1—8 Th'ds.			Diam.
Length	Un.	Doz.	Ea.	Un.	Doz.	Ea.	Un.	Doz.	Ea.	Un.	Doz.	Ea.	Un.	Doz.	Ea.	Length
$\frac{1}{8}$ to $\frac{1}{2}$	\$1.42	.21	.03	\$1.67	.25	.04	\$2.33	.35	.05	\$3.77	.55	.07	\$4.97	.75	.10	$\frac{1}{8}$ to $\frac{1}{2}$
1	1.42	.21	.03	1.67	.25	.04	2.33	.35	.05	3.77	.55	.07	4.97	.75	.10	1
$1\frac{1}{8}$	1.50	.23	.03	1.75	.26	.04	2.33	.35	.05	3.77	.55	.07	4.97	.75	.10	$1\frac{1}{8}$
$1\frac{1}{4}$	1.58	.24	.04	1.83	.28	.04	2.50	.38	.05	3.77	.55	.07	4.97	.75	.10	$1\frac{1}{4}$
$1\frac{1}{2}$	1.67	.25	.04	1.92	.30	.04	2.67	.40	.06	4.00	.60	.07	5.30	.80	.10	$1\frac{1}{2}$
2	1.77	.26	.04	2.02	.30	.05	2.87	.43	.06	4.30	.65	.08	5.67	.85	.10	2
$2\frac{1}{8}$	1.88	.28	.04	2.13	.32	.05	3.10	.46	.06	4.60	.70	.08	6.13	.92	.10	$2\frac{1}{8}$
$2\frac{1}{4}$	2.02	.30	.04	2.27	.34	.05	3.33	.50	.07	4.93	.75	.08	6.60	1.00	.12	$2\frac{1}{4}$
$2\frac{1}{2}$	2.17	.32	.05	2.42	.36	.06	3.60	.55	.08	5.30	.80	.09	7.13	1.08	.12	$2\frac{1}{2}$
3	2.33	.35	.05	2.58	.48	.06	3.90	.60	.08	5.70	.85	.09	7.67	1.15	.14	3
$3\frac{1}{8}$	2.70	.40	.06	2.98	.45	.07	4.57	.70	.10	6.57	1.00	.10	8.80	1.32	.15	$3\frac{1}{8}$
4	3.07	.45	.07	3.38	.50	.08	5.23	.80	.10	7.43	1.15	.12	9.93	1.50	.18	4

PRICE LIST SQUARE HEAD CAP SCREWS.

Diam.	$\frac{1}{8}$ —20 Th'ds.			$\frac{1}{4}$ —18 Th'ds.			$\frac{3}{8}$ —16 Th'ds.			$\frac{1}{2}$ —14 Th'ds.			$\frac{5}{8}$ —12 Th'ds.			Diam.
Length Un. Hd.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	Length Un. Hd.
$\frac{1}{2}$ to $\frac{1}{8}$	\$0.96	.16	.02	\$1.10	.17	.02	\$1.28	.20	.03	\$1.52	.24	.03	\$1.76	.28	.03	$\frac{1}{2}$ to $\frac{1}{8}$
1	1.04	.16	.02	1.18	.18	.02	1.36	.21	.03	1.60	.25	.03	1.88	.30	.03	1
$1\frac{1}{2}$	1.10	.17	.02	1.24	.19	.03	1.46	.23	.03	1.68	.26	.03	1.98	.31	.03	$1\frac{1}{2}$
$1\frac{1}{4}$	1.16	.18	.02	1.32	.20	.03	1.54	.24	.03	1.78	.28	.03	2.10	.33	.04	$1\frac{1}{4}$
$1\frac{3}{4}$	1.22	.19	.03	1.40	.22	.03	1.64	.25	.03	1.88	.30	.04	2.22	.35	.04	$1\frac{3}{4}$
2	1.30	.20	.03	1.48	.23	.04	1.54	.28	.04	1.98	.31	.04	2.36	.37	.04	2
$2\frac{1}{2}$				1.60	.25	.04	1.86	.30	.05	2.10	.33	.05	2.52	.40	.05	$2\frac{1}{2}$
$2\frac{3}{4}$							2.00	.32	.05	2.24	.35	.05	2.70	.42	.05	$2\frac{3}{4}$
$2\frac{1}{2}$										2.40	.38	.05	2.90	.45	.05	$2\frac{1}{2}$
3													3.12	.50	.06	3

Diam. $\frac{1}{8}$ —12 Th'ds.				$\frac{1}{4}$ —11 Th'ds.			$\frac{3}{8}$ —10 Th'ds.			$\frac{1}{2}$ —9 Th'ds.			1—8 Th'ds.			Diam.		
Lgth.	Un.	Hd.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	Lgth.
	1		\$2.30	.36	.04	\$3.08	.48	.05										1
	1 $\frac{1}{2}$		2.42	.38	.04	3.08	.48	.05	\$4.20	.66	.07							1 $\frac{1}{2}$
	1 $\frac{3}{4}$		2.54	.40	.05	3.30	.52	.06	4.20	.66	.07	\$5.60	.88	.10				1 $\frac{3}{4}$
	1 $\frac{1}{4}$		2.66	.42	.05	3.56	.55	.06	4.44	.70	.08	5.92	.93	.10	\$7.20	1.13	.12	1 $\frac{1}{4}$
	2		2.82	.44	.05	3.76	.60	.07	4.72	.75	.08	6.28	.98	.10	7.60	1.20	.13	2
	2 $\frac{1}{2}$		3.02	.47	.05	4.04	.63	.07	4.80	.80	.09	6.68	1.05	.12	8.08	1.26	.14	2 $\frac{1}{2}$
	2 $\frac{3}{4}$		3.26	.51	.06	4.36	.68	.07	5.40	.85	.09	7.12	1.10	.12	8.60	1.35	.15	2 $\frac{3}{4}$
	2 $\frac{1}{2}$		3.54	.55	.06	4.72	.74	.08	5.84	.90	.10	7.64	1.20	.12	9.24	1.45	.16	2 $\frac{1}{2}$
	3		3.86	.60	.06	5.12	.80	.09	6.36	1.00	.12	8.24	1.30	.14	10.00	1.55	.18	3
	3 $\frac{1}{2}$		4.58	.72	.08	6.08	.95	.10	7.56	1.20	.14	9.68	1.50	.16	11.74	1.85	.20	3 $\frac{1}{2}$
	4		5.30	.83	.10	7.04	1.10	.12	8.76	1.40	.15	11.12	1.75	.18	13.68	2.15	.23	4

PRICE LIST HEXAGON HEAD CAP SCREWS.

Diam.	$\frac{1}{8}$ —20 Th'ds.			$\frac{1}{4}$ —18 Th'ds.			$\frac{3}{8}$ —16 Th'ds.			$\frac{1}{2}$ —14 Th'ds.			$\frac{5}{8}$ —12 Th'ds.			Diam.
Length Un. Hd.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	Length Un. Hd.
$\frac{1}{2}$ to $\frac{1}{8}$	\$1.35	.21	.02	\$1.47	.22	.03	\$1.70	.26	.03	\$1.98	.30	.04	\$2.48	.37	.04	$\frac{1}{2}$ to $\frac{1}{8}$
1	1.47	.22	.03	1.58	.24	.03	1.80	.27	.03	2.12	.32	.04	2.57	.39	.04	1
$1\frac{1}{2}$	1.58	.24	.03	1.70	.26	.03	1.92	.29	.03	2.25	.34	.04	2.70	.41	.04	$1\frac{1}{2}$
$1\frac{1}{4}$	1.70	.26	.03	1.80	.27	.04	2.03	.31	.04	2.39	.36	.04	2.84	.43	.05	$1\frac{1}{4}$
$1\frac{3}{4}$	1.80	.28	.04	1.92	.29	.04	2.15	.32	.04	2.52	.38	.05	2.97	.45	.05	$1\frac{3}{4}$
2	1.92	.30	.04	2.07	.31	.04	2.28	.34	.04	2.68	.40	.05	3.15	.47	.05	2
$2\frac{1}{2}$				2.25	.34	.05	2.43	.37	.05	2.86	.43	.05	3.40	.51	.05	$2\frac{1}{2}$
$2\frac{3}{4}$							2.61	.40	.05	3.06	.46	.05	3.60	.54	.06	$2\frac{3}{4}$
$2\frac{1}{2}$										3.29	.50	.06	3.87	.58	.06	$2\frac{1}{2}$
3													4.19	.63	.07	3

Diam. $\frac{1}{8}$ —12 Th'ds.				$\frac{1}{4}$ —11 Th'ds.			$\frac{3}{8}$ —10 Th'ds.			$\frac{1}{2}$ —9 Th'ds.			1—8 Th'ds.			Diam.		
Lgth.																Lgth.		
Un.	Hd.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	100	Doz.	Ea.	Un.	Hd.
1		\$3.15	.47	.05	\$4.28	.64	.07										1	
1 $\frac{1}{2}$		3.38	.50	.06	4.28	.64	.07	\$5.49	.82	.09							1 $\frac{1}{2}$	
1 $\frac{1}{4}$		3.60	.54	.06	4.50	.68	.07	5.49	.82	.09	\$7.20	1.08	.12				1 $\frac{1}{4}$	
1 $\frac{3}{4}$		3.83	.58	.06	4.77	.71	.08	5.76	.86	.09	7.47	1.12	.12	\$9.54	1.43	.15	1 $\frac{3}{4}$	
2		4.10	.62	.07	5.04	.76	.08	6.03	.90	.10	7.74	1.16	.12	10.04	1.50	.16	2	
2 $\frac{1}{2}$		4.37	.66	.07	5.27	.79	.08	6.35	.95	.10	8.06	1.21	.14	10.62	1.60	.17	2 $\frac{1}{2}$	
2 $\frac{3}{4}$		4.86	.73	.08	5.73	.86	.09	6.70	1.00	.10	8.46	1.27	.14	11.30	1.70	.18	2 $\frac{3}{4}$	
2 $\frac{1}{2}$		5.04	.76	.08	6.12	.92	.10	7.07	1.06	.12	9.00	1.35	.15	12.10	1.82	.19	2 $\frac{1}{2}$	
3		5.45	.82	.09	6.52	.98	.10	7.65	1.15	.12	9.80	1.47	.16	13.05	1.95	.20	3	
3 $\frac{1}{2}$		6.35	.95	.10	7.70	1.15	.12	9.10	1.36	.15	11.60	1.74	.18	14.20	2.13	.22	3 $\frac{1}{2}$	
4		7.25	1.10	.12	8.92	1.35	.15	10.55	1.58	.18	13.40	2.00	.22	15.35	2.40	.25	4	

MACHINE SCREWS.

Read article on page 141—about Machine Screws.



FIG. 1535.

FLAT HEAD.



FIG. 1536.

ROUND HEAD.

For Taps and Dies see pages 141, 144
149, 152 and 153.

IRON.

BRASS.

IRON.

BRASS.

Lgt. In.	No.	Per Doz.	Flat Gro.	R'd. Gro.	No.	Per Doz.	Flat Gro.	R'd. Gro.
	6	0.05	.26	.28	6	0.08	.40	.49
	8	.05	.30	.32	8	.10	.53	.56
	10	.06	.33	.35	10	.12	.70	.75
	12	.06	.37	.40	12	.15	.84	.90
	14	.07	.42	.44	14	.18	1.02	1.10
	16	.08	.47	.50	16	.22	1.26	1.35
	18	.09	.53	.56	18	.28	1.54	1.65
	20	.10	.60	.60	20	.36	2.00	2.14
	24	.12	.74	.80	24	.50	2.80	3.00

Lgt. In.	No.	Per Doz.	Flat Gro.	R'd. Gro.	No.	Per Doz.	Flat Gro.	R'd. Gro.
	2	0.03	.16	.17	2	0.04	.21	.22
	4	.03	.16	.17	4	.04	.21	.22
	6	.03	.17	.18	6	.05	.23	.25
	8	.04	.19	.20	8	.06	.32	.34
	10	.04	.23	.24	10	.08	.42	.45
	2	.03	.16	.17	2	.04	.21	.22
	4	.03	.16	.17	4	.04	.21	.22
	6	.03	.17	.18	6	.05	.23	.25
	8	.04	.19	.20	8	.06	.32	.34
	10	.04	.23	.24	10	.08	.45	.45
	12	.05	.26	.27	12	.10	.53	.56
	14	.06	.32	.34	14	.12	.70	.75
	2	.03	.16	.17	2	.04	.21	.22
	4	.03	.16	.17	4	.04	.22	.24
	6	.03	.17	.18	6	.05	.25	.27
	8	.04	.19	.20	8	.06	.35	.38
	10	.04	.24	.26	10	.08	.46	.49
	12	.05	.27	.29	12	.10	.60	.64
	14	.06	.33	.34	14	.14	.77	.83
	16	.07	.39	.41	16	.17	.95	1.00
	18	.08		.45				
	4	.04	.18	.20	4	.05	.28	.30
	6	.04	.20	.22	6	.06	.32	.34
	8	.05	.24	.26	8	.07	.39	.41
	10	.05	.27	.29	10	.10	.53	.56
	12	.06	.30	.32	12	.12	.67	.71
	14	.06	.34	.36	14	.15	.84	.90
	16	.07	.42	.45	16	.20	1.05	1.13
	18	.08	.46	.49	18	.25	1.33	1.43
	20	.09	.53	.55	20	.30	1.75	1.87
	24	.10		.63				
	4	.04	.21	.23	4	.06	.35	.38
	6	.05	.24	.26	6	.07	.39	.41
	8	.05	.27	.29	8	.08	.46	.49
	10	.06	.30	.32	10	.10	.60	.64
	12	.06	.34	.36	12	.14	.74	.80
	14	.07	.37	.40	14	.16	.91	.98
	16	.08	.42	.45	16	.20	1.16	1.24
	18	.09	.47	.50	18	.25	1.44	1.54
	20	.10	.56	.60	20	.35	1.93	2.06
	24	.12	.67	.70	24	.45	2.63	2.80

	6	.05	.29	.31	6	.10	.53	.56
	8	.06	.32	.35	8	.12	.63	.68
	10	.07	.36	.38	10	.14	.77	.83
	12	.08	.41	.44	12	.16	.93	1.00
	14	.08	.46	.49	14	.20	1.12	1.20
	16	.10	.51	.55	16	.25	1.37	1.46
	18	.10	.57	.61	18	.30	1.65	1.76
	20	.12	.64	.68	20	.40	2.17	2.33
	24	.14	.81	.86	24	.60	3.33	3.56
	6	.07	.39	.41				
	8	.07	.39	.41	8	.14	.77	.83
	10	.08	.42	.45	10	.18	.98	1.05
	12	.09	.48	.51	12	.20	1.19	1.20
	14	.10	.53	.57	14	.24	1.33	1.43
	16	.10	.60	.64	16	.28	1.58	1.69
	18	.12	.67	.71	18	.35	1.93	2.06
	20	.14	.74	.79	20	.45	2.56	2.74
	24	.16	.95	1.00	24	.65	3.71	3.98
	10	.09	.49	.53	10	.20	1.16	1.24
	12	.10	.56	.60	12	.24	1.33	1.43
	14	.12	.63	.68	14	.28	1.54	1.65
	16	.12	.70	.75	16	.32	1.82	1.95
	18	.15	.81	.86	18	.40	2.24	2.40
	20	.16	.88	.94	20	.50	2.91	3.10
	24	.20	1.12	1.20	24	.75	4.24	4.55
	12	.12	.67	.71	12	.28	1.58	1.69
	14	.14	.77	.83	14	.32	1.79	1.90
	16	.15	.84	.90	16	.38	2.10	2.25
	18	.17	.95	1.00	18	.46	2.59	2.78
	20	.20	1.05	1.13	20	.60	3.26	3.50
	24	.24	1.33	1.43	24	.85	4.80	5.14
	30	.34	1.89	2.03	30	1.35	7.56	8.10
	14	.16	.88	.94	14	.35	2.10	2.25
	16	.18	.98	1.05	16	.40	2.45	2.63
	18	.20	1.12	1.20	18	.50	3.01	3.23
	20	.25	1.26	1.35	20	.60	3.50	3.75
	24	.30	1.58	1.69	24	.90	4.90	5.25
	30	.40	2.24	2.40	30	1.50	8.68	9.30
	20	.32	1.79	1.91	20	.85	4.66	5.00
	24	.40	2.24	2.40	24	1.10	6.44	6.90
	30	.55	3.15	3.38	30	2.00	11.34	12.15

For Iron and Brass nuts see page 444.

**FILLISTER HEAD MACHINE
SCREWS.**


FIG. 1537.

IRON.			BRASS.		
Lgth.	Per	Per	Per	Per	
In. No.	Doz.	Gross.	Doz.	Gross.	
1/2	4	\$0.03	\$0.18	\$0.04	\$0.23
	6	.03	.19	.05	.26
	8	.04	.22	.06	.36
3/4	4	.03	.18	.04	.23
	6	.03	.19	.05	.26
	8	.04	.22	.06	.36
1	4	.03	.18	.04	.23
	6	.03	.19	.05	.26
	8	.04	.22	.06	.36
1 1/4	4	.03	.18	.04	.23
	6	.03	.19	.05	.26
	8	.04	.22	.06	.36
1 1/2	4	.03	.18	.04	.23
	6	.03	.19	.05	.26
	8	.04	.22	.06	.36

IRON.			BRASS.		
Lgth.	Per	Per	Per	Per	
In. No.	Doz.	Gross.	Doz.	Gross.	
1/2	6	\$0.04	\$0.23	\$0.06	\$0.36
	8	.05	.27	.08	.44
	10	.05	.31	.10	.60
	12	.06	.36	.12	.76
3/4	14	.07	.39	.16	.96
	6	.05	.27	.08	.44
	8	.05	.30	.09	.52
	10	.06	.34	.12	.68
1	12	.06	.38	.14	.84
	14	.07	.42	.18	1.04
	16	.08	.48	.20	1.32
1 1/4	8	.06	.34	.10	.60
	10	.06	.38	.14	.80
	12	.07	.42	.16	.96
	14	.08	.48	.20	1.16
1 1/2	16	.09	.54	.25	1.44
	8	.06	.37	.13	.72
	10	.07	.41	.15	.88
	12	.08	.47	.18	1.08
2	14	.09	.52	.20	1.28
	16	.10	.58	.25	1.56
	18	.10	.65	.30	1.88
	20	.12	.73	.40	2.48

IRON.			BRASS.		
Lgth.	Per	Per	Per	Per	
In. No.	Doz.	Gross.	Doz.	Gross.	
1 1/2	10	\$0.08	\$0.48	\$0.20	\$1.12
	12	.09	.55	.20	1.28
	14	.10	.61	.25	1.52
	16	.12	.68	.30	1.80
2	18	.12	.76	.35	2.20
	20	.14	.84	.50	2.92
	24	.18	1.08	.60	4.24
2 1/2	12	.10	.64	.25	1.52
	14	.12	.72	.30	1.76
	16	.14	.80	.40	2.38
	18	.16	.92	.45	2.56
3	20	.18	1.00	.50	3.32
	24	.20	1.28	.60	4.84
3 1/2	12	.12	.76	.30	1.78
	14	.14	.88	.35	2.04
	16	.16	.96	.40	2.40
	18	.18	1.08	.50	2.96
4	20	.20	1.20	.60	3.72
	24	.25	1.52	.85	5.48
4 1/2	14	.16	1.00	.40	2.40
	16	.18	1.12	.50	2.80
	18	.20	1.28	.60	3.44
	20	.25	1.44	.65	4.40
5	24	.28	1.70	.90	5.60

SPECIALS.

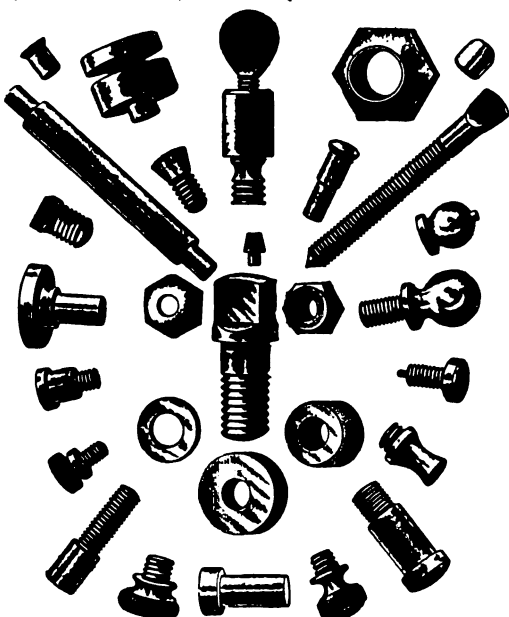
We have had the accompanying illustration made to show a few styles of Special Screws, Nuts, Washers, Collars, Pins, Rollers, etc.

These goods are all produced on Automatic Machines, and in large quantities can be furnished at very low prices.

As special tools have to be made for each size and style, the cost is considerable, hence it is inexpedient to figure on small lots. When only a few are required, the cheapest—and in fact the only practical—way is to make them in the lathe.

We will be pleased to name prices on any article of this character.

In writing, send sample if possible; if not, send drawing with exact and full particulars as to dimensions and kind of material.



THUMB SCREWS AND NUTS.

We present here a line of Supplies used largely by manufacturers, machinists, model-makers and amateurs. These Nuts and Bolts are all threaded to Machine Screw sizes. On page 419 will be found a table giving these sizes in decimals and approximate fractions.

We will be pleased to name special prices on large quantities of these and similar goods. See page 443 for odd styles of Screws and Nuts.



FIG. 1546.



FIG. 1547.

IRON SQUARE NUTS, FIG. 1546.

No.	4	6	8	10	12	14
100,	\$0.35	\$0.18	\$0.15	\$0.16	\$0.18	\$0.20
Doz.	.06	.04	.04	.04	.04	.03
No.	16	18	20	24	30	
100,	\$0.27	\$0.35	\$0.46	\$0.59	\$0.84	
Doz.	.05	.06	.08	.10	.15	

BRASS SQUARE NUTS, FIG. 1546.

No.	2	4	6	8	10	12	14
100,	\$0.70	\$0.70	\$0.87	\$1.05	\$1.10	\$1.15	\$1.20
Doz.	.12	.12	.14	.16	.18	.19	.20
Each,	.02	.02	.02	.02	.02	.03	.03

BRASS HEXAGON NUTS, FIG. 1547.

No.	6	10	14	20	24
100,	\$0.88	\$1.00	\$1.35	\$1.75	\$2.75
Doz.	.15	.17	.20	.30	.45
Each,	.02	.02	.03	.04	.05

BRASS CAP NUTS.

No.	6	10	14
Per 100,	\$3.00	\$3.00	\$4.50
Doz.	.45	.45	.65
FIG. 1548. Each,	.03	.03	.07



BRASS THUMB NUTS.

No.	6	10	14
Per 100,	\$2.25	\$2.50	\$4.00
FIG. 1549. Doz.	.35	.40	.60
Each,	.05	.03	.06



FIG. 1550.

BRASS THUMB SCREWS, WITH SHOULDER.

No.	6	8	10			
Lgth.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	1
100,	\$2.25	\$2.50	\$2.50	\$2.75	\$4.00	\$4.50
Doz.	.35	.38	.38	.40	.60	.70
Each,	.05	.05	.05	.05	.07	.08



FIG. 1551. BRASS THUMB NUT, WITH ROUND MILLED NUT.

No.	6	10	14			
Lgth.	1	1	$1\frac{1}{2}$	1	$1\frac{1}{2}$	2
100,	\$3.90	\$4.65	\$5.25	\$6.65	\$7.50	\$8.20
Doz.	.60	.70	.80	1.00	1.15	1.25
Each,	.07	.08	.09	.10	.12	.14

BRASS BOLTS.

For Marble, Slate and Wood-work in bath and wash-rooms, laundries, and many similar purposes, it will be found necessary to use Brass Bolts. On page 443 will be found a line of Brass Machine Screws, round, flat and fillister head, and these can be used in connection with the Square and Hexagon Brass Nuts, or the Square Iron Nuts, Figs. 1546, 1547, 1548 and 1549, thus enabling one to secure a great variety of sizes and styles.



FIG. 1552. SCREW THREADED WIRE.

The above cut represents a convenient method of making small bolts for connecting parts of models and other purposes. This wire may be cut to any desired length, and by putting a nut on each end, used as a bolt.

The Brass Cap Nut, Fig. 1548, makes a neat finish, as it is not drilled wholly through, and covers the end of the screw.

No.	6	10	14
Per Ft., Brass,	\$0.10	\$0.15	\$0.20
" " Iron,	.03	.13	.17

FIG. 1553.

MALLEABLE THUMB NUTS, NOT THREADED.

The Malleable Iron Thumb Nuts are furnished as per sizes below. The $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{2}$ inch Nuts have no hole cast in them; larger sizes have hole.

Size,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Per Lb.	\$0.40	\$0.20	\$0.13	\$0.13
Per Doz.	.06	.07	.07	.08
No. in Lb.	140	75	50	35
Size,	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Per Lb.	\$0.12	\$0.12	\$0.12	\$0.12
No. in Lb.	22	12	9	3 $\frac{1}{2}$

MALLEABLE THUMB NUTS, THREADED.

These are threaded to fit Machine and Carriage bolts, the threads being according to the United States Standard. Can

furnish them with regular V thread, but do not ordinarily carry them in stock.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2
100,	\$0.80	\$0.80	\$1.10	\$1.50	\$2.10	\$2.20
Doz.	.15	.15	.20	.25	.30	.35
Each,	.02	.02	.02	.03	.03	.04

The Malleable Iron Thumb Screws are exact diameters, and threaded as follows:

The $\frac{1}{4}$, 40; $\frac{1}{2}$, 24; 1 , 20; $1\frac{1}{2}$, 18; 2 , 16; and $2\frac{1}{2}$, 14 threads

to the inch.

Diam.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Length,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Per 100,	\$1.13	\$1.50	\$1.50	\$2.10	\$2.25
" Doz.	.17	.22	.22	.32	.32
Each,	.03	.03	.03	.04	.04
Diam.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Length,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Per 100,	\$3.00	\$3.45	\$3.90	\$3.75	\$4.20
" Doz.	.45	.52	.58	.55	.63
Each,	.05	.06	.06	.06	.07
Diam.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Length,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Per 100,	\$4.65	\$5.10	\$5.07	\$5.45	\$5.85
" Doz.	.70	.75	.75	.80	.90
Each,	.07	.08	.08	.09	.10



FIG. 1557.
THUMB NUT.



FIG. 1558.
THUMB SCREW.

Drop-forged Thumb Nuts and Screws cost from two to three times as much as the malleable iron. For some purposes where a very nice job is desired, they are worth the difference, but for general purposes the malleable iron are all right. We can furnish the Drop-forged steel in a great variety of sizes and styles; ordinarily we carry but few sizes in stock.



FIG.
1559.
MILLED
STUD.

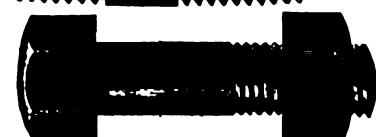


FIG. 1560. COUPLING BOLT.



FIG. 1561.

PLANNER HEAD BOLT.

The Milled Studs, Coupling Bolts and Planer Head Bolts are not kept in stock, but can be furnished in either Iron or Steel, the Steel costing one-half more than the Iron. In writing, give lengths of the different parts. Prices upon application, stating quantity.

FIG. 1562.

BOILER

PATCH BOLTS.

We carry these in stock with 12 threads to the inch; can furnish them with other threads, or blank, as desired. For Patch Bolt Taps, see page 140.



Length.			Length.		
Diam.	1 in.	1 1/4 in.	Diam.	1 in.	1 1/4 in.
$\frac{1}{2}$	100 \$4.80	\$5.50	$\frac{1}{2}$	100 \$9.50	\$10.50
" Doz.	.72	.83	" Doz.	1.40	1.60
" Ea.	.08	.09	" Ea.	.14	.16
$\frac{3}{4}$	100 \$6.50	\$7.25	1	100 13.50	\$14.75
" Doz.	.95	1.05	" Doz.	2.00	2.20
" Ea.	.10	.11	" Ea.	.30	.32

FIG. 1563.

STEEL WASHERS.

See also Copper and Steel Burrs.



Our Washers are punched from steel, and are clean, smooth, and true to size.

Size of Bolt.	Per Lb.	No. in. Diam. 10 Lbs.	In.	Size Eng. Wire Hole.	Eng. Wire Gauge.
$\frac{1}{4}$	\$0.18				No. 18
$\frac{1}{2}$	.09	1,390	$\frac{1}{2}$	$\frac{1}{4}$	" 16
$\frac{3}{4}$	.08	1,125	$\frac{3}{4}$	$\frac{1}{2}$	" 16
1	.07	545	1	$\frac{3}{4}$	" 14
$1\frac{1}{2}$	.06	260	$1\frac{1}{2}$	1	" 14
2	.05	200	2	$1\frac{1}{2}$	" 12
$2\frac{1}{2}$	.04	170	$2\frac{1}{2}$	2	" 12
3	.04	131	3	$2\frac{1}{2}$	" 10
$3\frac{1}{2}$	.04	101	$3\frac{1}{2}$	3	" 10
4	.04	86	4	$3\frac{1}{2}$	" 9
$4\frac{1}{2}$	.04	62	$4\frac{1}{2}$	4	" 9
5	.04	52	5	$4\frac{1}{2}$	" 9
$5\frac{1}{2}$	.04	40	$5\frac{1}{2}$	5	" 9
6	.04	32	6	$5\frac{1}{2}$	" 8
$6\frac{1}{2}$	.04	28	$6\frac{1}{2}$	6	" 8
7	.04	24	7	$6\frac{1}{2}$	" 8
$7\frac{1}{2}$	.04	22	$7\frac{1}{2}$	7	" 8
8	.04	19	8	$7\frac{1}{2}$	" 8
$8\frac{1}{2}$	.04	17	$8\frac{1}{2}$	8	" 8



FIG. 1564. CAST IRON WASHERS.

Cast Iron Washers we carry in stock in the following sizes:

Size, Bolt.	Dozen.	Each.	Diam.	Size, Hole.	Thickness.
$\frac{1}{8}$	\$0.15	\$0.02	$2\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{4}$	.30	.04	$2\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{3}{8}$	.40	.05	3	$\frac{3}{8}$	$\frac{3}{8}$
$\frac{1}{2}$	.60	.07	$3\frac{1}{2}$	1	$\frac{1}{2}$
1	.90	.10	4	$1\frac{1}{2}$	1
$1\frac{1}{2}$	1.25	.14	$4\frac{1}{2}$	$1\frac{1}{2}$	1
$1\frac{3}{4}$	1.50	.17	5	$1\frac{3}{4}$	1
2	2.00	.20	$5\frac{1}{2}$	2	$1\frac{1}{2}$



FIG. 1565. HOT PRESSED NUTS.

This is the style of Nut commonly used for general purposes, and is the same that will be found on Carriage and Machine Bolts. The prices given here are for Blank (or Untapped) Nuts.

We will name prices on Tapped Nuts upon application stating dimensions and quantity.

Size, Bolt.	Size, Hole.	Thick- ness.	Square, Per Lb. \$0.10	Hexagon, Per Lb. \$0.19
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	.08 $\frac{1}{2}$	.15
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	.07	.11
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	.05 $\frac{1}{2}$	.08 $\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	.04 $\frac{1}{2}$	.07 $\frac{1}{2}$
$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	.04 $\frac{1}{2}$	.07
1	1	1	.04	.06
1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	.03 $\frac{1}{2}$	.06
2	2	2	.03 $\frac{1}{2}$	.05 $\frac{1}{2}$
2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	.03 $\frac{1}{2}$	.05 $\frac{1}{2}$
3	3	3	.03 $\frac{1}{2}$	.05 $\frac{1}{2}$
3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	.03 $\frac{1}{2}$	.05 $\frac{1}{2}$
4	4	4	.04	.06
4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	.04 $\frac{1}{2}$	.06 $\frac{1}{2}$
5	5	5	.05	.07
5 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{1}{2}$	.05 $\frac{1}{2}$	.08

TAPPED NUTS.

(See also Nuts, page 444.)

The following refers to Cold Punched Nuts threaded and in different finishes:

The Nuts carried in stock by us are threaded to exact standard sizes, and with the V form of thread as per table on page 137. We can furnish to order (and usually have some sizes on hand) threaded according to the Franklin Institute or U. S. Standard form of thread.



FIG. 1569.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
100,	\$0.80	\$1.00	\$1.30	\$1.50	\$1.60	\$2.00
Doz.	.12	.15	.20	.23	.24	.30
Each,	.09	.02	.03	.03	.03	.03
Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
100,	\$3.20	\$3.00	\$4.00	\$5.40	\$6.80	\$9.60
Doz.	.33	.45	.60	.81	1.02	1.44
Each,	.04	.05	.06	.08	.10	.14
Size,	1 $\frac{1}{2}$	2	3	4	5	6
100,	\$17.00	\$22.00	\$35.00	\$55.00		
Each,	.20	.25	.40	.65		

FINISHED AND CASE-HARDENED.



FIG. 1570.

being Case-hardened, when desired.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
100,	\$2.70	\$3.15	\$3.60	\$4.05	\$4.50	\$5.40
Doz.	.40	.47	.54	.60	.68	.81
Each,	.04	.05	.05	.06	.07	.08
Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
100,	\$6.75	\$8.10	\$9.90	\$13.50	\$15.75	\$20.25
Doz.	1.02	1.21	1.48	2.02	2.35	3.04
Each,	.10	.12	.15	.20	.23	.30
Size,	1 $\frac{1}{2}$	2	3	4	5	6
100,	\$27.50	\$32.50	\$50.00	\$100.00		
Each,	.32	.40	.60	1.20		

UNFINISHED NUTS.

These are accurately threaded, but are not finished in any other way. They are

vastly superior to the Hot Pressed Nuts.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
100,	\$0.64	\$0.80	\$1.05	\$1.20	\$1.35	\$1.60
Doz.	.12	.12	.16	.18	.20	.24
Size,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
100,	\$1.85	\$2.55	\$3.40	\$4.75	\$8.00	\$8.50
Doz.	.27	.38	.50	.70	.90	1.25

STOVE BOLTS.

Stove Bolts have a form of thread peculiar to themselves, and as shown in cut. We carry in stock the sizes given here; can furnish, shipped from factory, other lengths, and also $\frac{1}{4}$ and $\frac{1}{2}$ diam.

Prices upon application stating quantity.



FIG. 1571.

FLAT HEAD STOVE BOLTS.

Diam.	3-16	1-4	5-16	3-8
Lgth.	100 Doz.	100 Doz.	100 Doz.	100 Doz.
$\frac{1}{8}$	\$0.27 .05			
$\frac{1}{4}$	.27 .05	\$0.30 .05		
$\frac{3}{8}$	.27 .05	.30 .05	\$0.48 .07	\$1.00 .15
1	.30 .05	.32 .05	.50 .08	1.00 .15
1 $\frac{1}{2}$	.32 .05	.35 .06	.52 .08	1.00 .15
1 $\frac{1}{4}$	.35 .06	.36 .06	.54 .08	1.00 .15
1 $\frac{1}{2}$	.36 .06	.39 .06	.57 .09	1.00 .15
2	.39 .06	.41 .07	.60 .09	1.00 .15
2 $\frac{1}{2}$	.43 .07	.45 .07	.63 .09	1.08 .15
3	.48 .07	.50 .08	.68 .10	1.17 .18
3 $\frac{1}{2}$	.52 .08	.54 .08	.72 .10	1.26 .18
4	.57 .09	.60 .09	.78 .10	1.35 .20
4 $\frac{1}{2}$	.62 .10	.63 .10		
5	.66 .12	.68 .12		
6	.75 .15	.78 .15		



FIG. 1572.

ROUND HEAD STOVE BOLTS.

Diam.	3-16	1-4	5-16	3-8
Lgth.	100 Doz.	100 Doz.	100 Doz.	100 Doz.
$\frac{1}{8}$	\$0.39 .06			
$\frac{1}{4}$	.39 .06	\$0.43 .06		
$\frac{3}{8}$	.39 .06	.43 .06	\$0.62 .10	\$1.13 .16
1	.41 .06	.45 .07	.68 .10	1.17 .17
1 $\frac{1}{2}$	.43 .06	.48 .07	.70 .10	1.23 .18
1 $\frac{1}{4}$	.45 .07	.50 .08	.75 .12	1.26 .18
1 $\frac{1}{2}$	.48 .07	.52 .08	.77 .12	1.29 .20
2	.52 .08	.54 .09	.80 .12	1.31 .20
2 $\frac{1}{2}$	.54 .08	.59 .09	.84 .12	1.40 .21
3	.59 .09	.63 .10	.90 .14	1.50 .23
3 $\frac{1}{2}$	.63 .09	.68 .10	.93 .14	1.58 .24
4	.68 .10	.72 .12	.98 .14	1.67 .25
4 $\frac{1}{2}$	.72 .10	.78 .12		
5	.78 .12	.81 .14		
6	.85 .15	.90 .16		

MACHINE BOLTS.

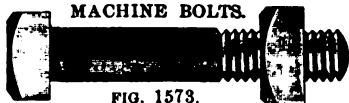


FIG. 1573.

Up to within the past year or two, there has been no standard among the different manufacturers of Machine and Carriage Bolts. Within this time, however, they have, by common consent, adopted the U. S., or Franklin Institute, form of threads. (See page 137.)

These Bolts were formerly made over-size, but as now made, they are a trifle scant.



FIG. 1574

For 1 extra Square Nut to each Bolt, add per 100 Bolts, as follows:

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	.30	.40	.50	.70
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	1.30	1.80	3.60	5.40

One extra Hexagon Nut to each Bolt, add per 100 Bolts, as follows:

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	.44	.60	.70	1.00
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	1.60	2.20	4.10	6.00



FIG. 1575.

Bolts with Hexagon Heads made to order only; cannot furnish small quantities. For prices add 10 per cent to Machine Bolt List.



FIG. 1576.

For Hexagon Nut in place of Square Nut, add per 100 Bolts:

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	.14	.20	.20	.30
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Price, \$	.30	.40	.50	.60

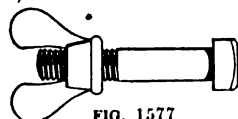


FIG. 1577.

For Thumb Nut in place of Square Nut, add per 100 Bolts:

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Price, \$	.50	.70	1.00	1.50	1.50

PRICE LIST FOR MACHINE BOLTS.

Diam.	Length.	$\frac{1}{4}$ in.			$\frac{1}{2}$ in.			1 in.			Length.		
		100	Doz.	Ex.	100	Doz.	Ex.	100	Doz.	Ex.			
1 to 1 1/4	1	\$0.84	13	.02	\$1.06	16	.02	\$1.38	21	.02	1 to 1 1/4	1	to 1 1/4
2	2	.87	13	.02	1.14	17	.02	1.47	22	.03	2	2	2
2 1/2	2 1/2	.90	14	.02	1.20	18	.02	1.56	23	.03	2 1/2	2 1/2	2 1/2
3	3	.93	14	.02	1.26	19	.02	1.63	25	.03	3	3	3
3 1/2	3 1/2	.96	15	.02	1.32	20	.03	1.74	26	.03	3 1/2	3 1/2	3 1/2
4	4	.99	15	.02	1.38	21	.03	1.83	27	.03	4	4	4
4 1/2	4 1/2	1.02	15	.02	1.44	22	.03	1.92	29	.03	4 1/2	4 1/2	4 1/2
5	5	1.05	16	.02	1.50	23	.03	2.01	30	.03	5	5	5
5 1/2	5 1/2	1.08	16	.02	1.56	24	.03	2.10	32	.04	5 1/2	5 1/2	5 1/2
6	6	1.11	17	.02	1.62	24	.03	2.19	33	.04	6	6	6
6 1/2	6 1/2	1.14	17	.02	1.68	25	.03	2.28	34	.04	6 1/2	6 1/2	6 1/2
7	7	1.17	18	.02	1.74	26	.03	2.37	36	.04	7	7	7
7 1/2	7 1/2	1.20	18	.02	1.80	27	.03	2.46	37	.04	7 1/2	7 1/2	7 1/2
8	8	1.23	19	.02	1.86	28	.04	2.55	38	.04	8	8	8
8 1/2	8 1/2	1.26	19	.02	1.92	29	.04	2.64	39	.04	8 1/2	8 1/2	8 1/2
9	9	1.29	20	.03	2.00	30	.04	2.73	41	.05	9	9	9
9 1/2	9 1/2	1.32	20	.03	2.06	31	.04	2.82	42	.05	9 1/2	9 1/2	9 1/2
10	10	1.35	21	.03	2.13	32	.04	2.91	44	.05	10	10	10
10 1/2	10 1/2	1.38	21	.03	2.19	33	.04	3.00	45	.05	10 1/2	10 1/2	10 1/2
11	11	1.41	22	.03	2.26	34	.04	3.09	46	.05	11	11	11
11 1/2	11 1/2	1.44	22	.03	2.32	35	.04	3.18	47	.05	11 1/2	11 1/2	11 1/2
12	12	1.47	23	.03	2.40	36	.04	3.27	48	.05	12	12	12
12 1/2	12 1/2	1.50	23	.03	2.46	37	.04	3.36	49	.05	12 1/2	12 1/2	12 1/2
13	13	1.53	24	.03	2.54	38	.04	3.45	50	.05	13	13	13
13 1/2	13 1/2	1.56	24	.03	2.60	39	.04	3.54	51	.05	13 1/2	13 1/2	13 1/2
14	14	1.59	25	.03	2.67	40	.04	3.63	52	.05	14	14	14
14 1/2	14 1/2	1.62	25	.03	2.73	41	.04	3.72	53	.05	14 1/2	14 1/2	14 1/2
15	15	1.65	26	.03	2.80	42	.04	3.81	54	.05	15	15	15
15 1/2	15 1/2	1.68	26	.03	2.86	43	.04	3.90	55	.05	15 1/2	15 1/2	15 1/2
16	16	1.71	27	.03	2.93	44	.04	3.99	56	.05	16	16	16
16 1/2	16 1/2	1.74	27	.03	3.00	45	.04	4.08	57	.05	16 1/2	16 1/2	16 1/2
17	17	1.77	28	.03	3.07	46	.04	4.17	58	.05	17	17	17
17 1/2	17 1/2	1.80	28	.03	3.14	47	.04	4.26	59	.05	17 1/2	17 1/2	17 1/2
18	18	1.83	29	.03	3.21	48	.04	4.35	60	.05	18	18	18
18 1/2	18 1/2	1.86	29	.03	3.28	49	.04	4.44	61	.05	18 1/2	18 1/2	18 1/2
19	19	1.89	30	.03	3.35	50	.04	4.53	62	.05	19	19	19
19 1/2	19 1/2	1.92	30	.03	3.42	51	.04	4.62	63	.05	19 1/2	19 1/2	19 1/2
20	20	1.95	31	.03	3.49	52	.04	4.71	64	.05	20	20	20
20 1/2	20 1/2	1.98	31	.03	3.56	53	.04	4.80	65	.05	20 1/2	20 1/2	20 1/2
21	21	2.01	32	.03	3.63	54	.04	4.89	66	.05	21	21	21
21 1/2	21 1/2	2.04	32	.03	3.70	55	.04	4.98	67	.05	21 1/2	21 1/2	21 1/2
22	22	2.07	33	.03	3.77	56	.04	5.07	68	.05	22	22	22
22 1/2	22 1/2	2.10	33	.03	3.84	57	.04	5.16	69	.05	22 1/2	22 1/2	22 1/2
23	23	2.13	34	.03	3.91	58	.04	5.25	70	.05	23	23	23
23 1/2	23 1/2	2.16	34	.03	3.98	59	.04	5.34	71	.05	23 1/2	23 1/2	23 1/2
24	24	2.19	35	.03	4.05	60	.04	5.43	72	.05	24	24	24

SPECIAL.

We present on this page, illustrations of various styles of Bolts, Clamps, etc. Very few of these styles are carried in stock, the majority being made to order only. Prices will be given upon application stating quantity.



FIG. 1578. MACHINE BOLT BLANK.



FIG. 1579. KEY BOLT.

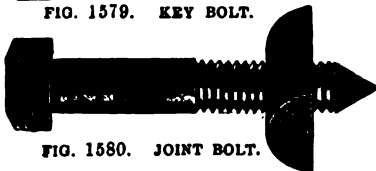


FIG. 1580. JOINT BOLT.

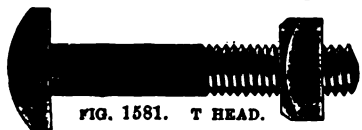


FIG. 1581. T HEAD.

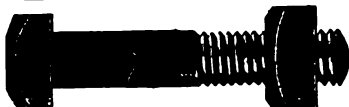


FIG. 1582. SQUARE NECK MACHINE.

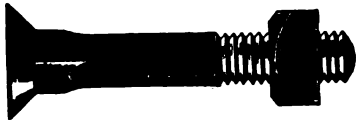


FIG. 1583. COUNTERSUNK HEAD.

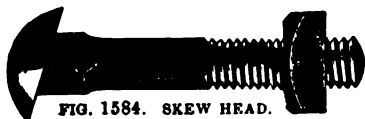


FIG. 1584. SKEW HEAD.



1585. TRACK.

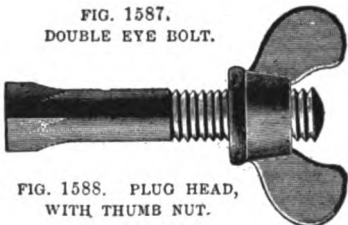
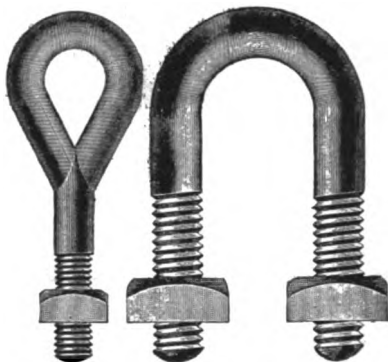
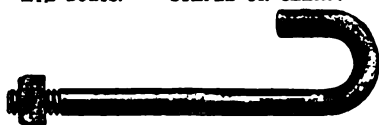
FIG. 1586
BOLT END.FIG. 1587.
DOUBLE EYE BOLT.FIG. 1588. PLUG HEAD,
WITH THUMB NUT.FIG. 1589.
EYE BOLTS.FIG. 1590.
STAPLE OR CLAMP.

FIG. 1591. HANGER HOOK.



FIG. 1592. SINGLE AND DOUBLE STIRRUP.

CARRIAGE BOLTS.

Carriage Bolts are similar in diameters, form of thread, etc., to Machine Bolts, and we can furnish them with extra nuts, Square, Hexagon and Thumb Nuts as per prices on page 448.

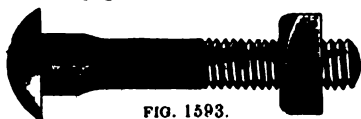


FIG. 1593.

Diam. 3-16 & 1-4				5-16 in.				3-8 in.			
Length.											
In.	Per 100	Doz.		100	Doz.	100	Doz.	100	Doz.	100	Doz.
1 to 1½	\$0.41	.06		\$0.48	.07	\$0.69	.11				
1½	.42	.06		.51	.08	.69	.11				
2	.44	.07		.53	.08	.69	.11				
2½	.45	.07		.55	.09	.72	.12				
2½	.47	.08		.57	.09	.75	.12				
2½	.48	.08		.60	.09	.78	.13				
3	.50	.09		.62	.10	.81	.13				
3½	.51	.09		.64	.10	.84	.13				
3½	.53	.09		.66	.10	.87	.14				
3½	.54	.10		.69	.11	.90	.14				
4	.56	.10		.71	.11	.93	.15				
4½				.75	.12	.99	.15				
5				.80	.12	1.05	.16				
5½				.84	.13	1.11	.17				
6				.89	.14	1.17	.18				
6½				.93	.15	1.23	.19				
7				.98	.15	1.29	.20				
8				1.07	.16	1.41	.22				
9						1.53	.24				
10						1.65	.26				

Diam. 7-16 in.				1-2 in.			
Length.							
In.	Per 100	Per Doz.		Per 100	Per Doz.		
1 to 1½	\$0.93	\$0.15		\$1.14	\$0.17		
2	.93	.15		1.14	.17		
2½	1.00	.15		1.24	.19		
3	1.08	.16		1.34	.20		
3½	1.16	.17		1.43	.22		
4	1.23	.19		1.52	.23		
4½	1.31	.20		1.62	.25		
5	1.38	.21		1.72	.26		
5½	1.46	.22		1.81	.28		
6	1.53	.23		1.91	.30		
6½	1.61	.24		2.00	.30		
7	1.68	.25		2.10	.32		
7½	1.76	.26		2.20	.33		
8	1.83	.28		2.30	.35		
9	1.98	.30		2.50	.38		
10	2.13	.32		2.70	.40		
12	2.43	.37		3.10	.45		

Extras for Carriage Bolts same as for Machine Bolts. See page 448.

For Special Bolts, see page 449.

GIMLET-POINTED COACH SCREWS.

We carry in stock the Coach Screws made by the American Screw Co. These, while costing a trifle more than the common run, are cleaner cut, stronger, and more easily put in. We think they are well worth the slight difference in price.

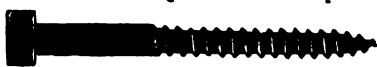


FIG. 1594.

Diam. 1-4 in.				5-16 in.				3-8 in.			
Length.											
In.	100	Doz.	Per Ea.	100	Doz.	Per Ea.		100	Doz.	Per Ea.	
1½	\$0.81	.12	2c	\$0.81	.12	2c		\$0.93	.15	2c	
2	.87	.14	2c	.87	.14	2c		.99	.15	2c	
2½	.93	.15	2c	.93	.15	2c		1.05	.16	2c	
3	.99	.15	2c	.99	.15	2c		1.11	.17	2c	
3½	1.05	.16	2c	1.05	.16	2c		1.17	.18	2c	
4	1.11	.17	2c	1.11	.17	2c		1.23	.19	3c	
4½								1.29	.20	3c	
5	1.23	.19	3c	1.23	.19	3c		1.35	.21	3c	
5½								1.41	.23	3c	
6	1.35	.21	3c	1.35	.21	3c		1.47	.23	3c	
7								1.59	.24	3c	
8								1.71	.26	3c	

Diam. 1-2 in.				5-8 in.				3-4 in.			
Length.											
In.	100	Doz.	Per Ea.	100	Doz.	Per Ea.		100	Doz.	Per Ea.	
1½	\$1.29	.19	3c								
2	1.40	.21	2c	\$1.95	.30	3c					
2½	1.50	.23	3c	2.19	.32	4c					
3	1.61	.24	3c	2.28	.34	4c		\$3.30	.50	5c	
3½	1.71	.26	3c	2.45	.37	4c					
4	1.82	.28	3c	2.61	.40	5c		3.75	.56	6c	
4½	1.92	.30	3c	2.68	.42	5c					
5	2.03	.31	4c	2.94	.45	5c		4.20	.63	6c	
5½	2.13	.32	4c								
6	2.25	.34	4c	3.27	.50	5c		4.65	.70	7c	
7	2.46	.37	4c	3.60	.54	6c		5.10	.77	8c	
8	2.67	.40	5c	3.93	.60	6c		5.55	.84	9c	
9	2.88	.43	5c	4.26	.64	6c		6.00	.90	9c	
10	3.09	.46	5c	4.59	.70	7c		6.45	.97	10c	
11	3.30	.49	6c	4.92	.75	8c					
12	3.51	.55	7c	5.52	.80	9c		7.35	1.10	12c	

INQUIRIES.—We have endeavored throughout this book, to answer a great many of the inquiries commonly received by us, but we wish it understood that we are at the service of our patrons and will cheerfully give any information that lies in our power to obtain. In this connection, we wish to say, that questions asked by our customers are sometimes overlooked. We do not mean to be careless, and if any inquiries are not answered, we kindly ask that they be repeated.

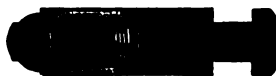


FIG. 1595.

CHURCH'S EXPANSION CASE BOLTS.

There are a number of styles of Expansion Bolts on the market, but we believe that the Church Patent is the strongest, simplest, and best bolt of this type.

Among other purposes for which Expansion Bolts may be used, are the hanging of Steam and Water Pipes in overhead arches and side-walls, fastening Iron Railings, Signs, Balconies, Fire Escapes, Guy Wires for Smoke Stacks, Telegraph Poles, etc., for Iron Shutters, Window and Door Frames, fastening down Bed Plates to engines and machinery of all kinds. There are endless other uses that will readily suggest themselves to mechanics.

This method of fastening does away with the use of lead, brimstone, cement, and wood plugging. The value of time saved will pay for the use of these Bolts, to say nothing about the gain in strength.

L'gth,	Diameter.			
	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
3 100	\$6.85	\$9.70		
3 Doz.	1.05	1.45		
3 $\frac{1}{2}$ 100	6.90	9.80	\$15.00	
3 $\frac{1}{2}$ Doz.	1.05	1.45	2.30	
4 100	6.95	9.90	15.15	\$20.70 \$27.40
4 Doz.	1.05	1.50	2.20	3.10 4.10
4 $\frac{1}{2}$ 100	6.95	9.90	15.25	20.95 27.70
4 $\frac{1}{2}$ Doz.	1.05	1.50	2.30	3.15 4.15
5 100	7.00	10.00	15.40	21.20 28.00
5 Doz.	1.05	1.50	2.30	3.20 4.20
6 100		10.15	15.70	21.60 28.60
6 Doz.		1.55	2.40	3.25 4.30
7 100		10.30	15.90	22.00 29.00
7 Doz.		1.55	2.40	3.30 4.30
8 100		10.50	16.25	22.50 29.40
8 Doz.		1.60	2.45	3.40 4.50
9 100			16.50	23.00 30.40
9 Doz.			2.50	3.45 4.55
10 100			16.80	23.35 31.00
10 Doz.			2.55	3.55 4.60
L'gth, Case, 1 $\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	4 in.
Diam. "	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$

The sizes as given in this list are the sizes of iron of which the Bolt is made—not the Case. The length and diameter of Case are given at bottom of table.

We can also furnish other sizes when desired.

TURN BUCKLES.



FIG. 1596. HEXAGONAL TURN BUCKLE.

O—Opening between heads $5\frac{1}{2}$ inches.
H—Length of Tapped Heads.
L—Length without Bolt Ends.
T—Total length over all.

These Turn Buckles are made from the best charcoal iron, contain 25 per cent more thread in the head than is common, and are stronger than any we know of. The shape admits of their being used with an ordinary wrench, no matter in what position they may be.

Diameter.	Each.	H.	L.	T.
$\frac{1}{2}$ in.	\$0.30	$\frac{1}{2}$ in.	$7\frac{1}{2}$ in.	22 in.
$\frac{3}{4}$ "	.32	$\frac{3}{4}$ "	$7\frac{1}{2}$ "	22 "
1 "	.34	1 "	$7\frac{1}{2}$ "	22 "
$1\frac{1}{2}$ "	.36	$1\frac{1}{2}$ "	$7\frac{1}{2}$ "	22 "
2 "	.38	$1\frac{1}{2}$ "	$7\frac{1}{2}$ "	22 "
$2\frac{1}{2}$ "	.48	$1\frac{1}{2}$ "	$8\frac{1}{2}$ "	23 "
3 "	.57	$1\frac{1}{2}$ "	$8\frac{1}{2}$ "	24 "
$3\frac{1}{2}$ "	.66	$1\frac{1}{2}$ "	9 "	25 "
4 "	.75	$1\frac{1}{2}$ "	$9\frac{1}{2}$ "	25 "
$4\frac{1}{2}$ "	.94	$2\frac{1}{2}$ "	$9\frac{1}{2}$ "	26 "
5 "	1.04	$2\frac{1}{2}$ "	$10\frac{1}{2}$ "	27 "
$5\frac{1}{2}$ "	1.13	$2\frac{1}{2}$ "	$10\frac{1}{2}$ "	27 "
6 "	1.50	$3\frac{1}{2}$ "	$11\frac{1}{2}$ "	28 "
$6\frac{1}{2}$ "	2.00	$3\frac{1}{2}$ "	12 "	29 "
7 "	2.62	$3\frac{1}{2}$ "	$12\frac{1}{2}$ "	30 "
$7\frac{1}{2}$ "	3.27	4 "	$13\frac{1}{2}$ "	32 "

We can furnish extra lengths to order. Prices upon application stating quantity.



FIG. 1597. BRASS TURN BUCKLES.

These small Turn Buckles will be found useful for many purposes. The length given is when screwed up. The movement of screw varies in the different sizes from $\frac{1}{2}$ to 2 inches.

Length, 1 $\frac{1}{2}$	2 $\frac{1}{2}$	3	4 $\frac{1}{2}$	5
Each, \$0.20	\$0.25	\$0.30	\$0.40	\$0.45
Diam.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$

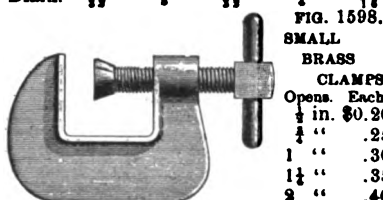


FIG. 1598.

SMALL BRASS CLAMPS.	
Opens.	Each.
$\frac{1}{2}$ in.	\$0.20
$\frac{3}{4}$ "	.25
1 "	.30
$1\frac{1}{2}$ "	.35
2 "	.40

Cheaper to buy than make.

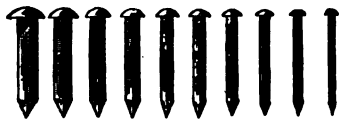


FIG. 1599. BRASS ESCUTCHEON PINS.

We sell the Wallace & Son's make of Escutcheon Pins; they have perfect heads and points, and the heads are warranted not to break in riveting. Although a little higher in price, they are better goods than any other we know of.

We sell quantities of these to be used as Rivets.

The numbers are by English wire gauge. For Gauge table, see page 419.

PRICE LIST PER LB.

No.	Length.					
	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
10					\$0.28	\$0.35
12		\$0.39	\$0.38	\$0.37	.37	.36
13		.39	.38	.38	.37	.37
14		.40	.39	.38	.38	.37
15		.41	.39	.39	.38	.37
16	\$0.45	.43	.41	.40	.39	.38
17	.50	.46	.45	.44	.43	.42
18	.55	.50	.48	.47	.46	.45
19	.60	.58	.55	.53		
20	.63	.63	.60			

No.	Length.				
	1	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
10	\$0.35	\$0.34			
12	.36	.35	\$0.34	\$0.34	\$0.34
13	.36	.36	.35	.35	.35
14	.37	.36	.36	.35	.35
15	.37	.36	.36		
16	.38	.37			

Escutcheon Pins are put up in one lb. boxes, and when we break packages we charge a uniform price of 5 cents per oz. for all sizes.

We can furnish to order Nickel and Silver-plated, also Iron Escutcheon Pins.

BRASS GONGS.



FIG. 1600.

These Gongs are used for Electrical purposes, Clocks, Bell Punches, Call-bells, etc.; they are made of the best material. We carry in stock sizes printed here; smaller and larger sizes furnished to order, and also special prices in large quantities.

	1 $\frac{1}{2}$	1 $\frac{1}{4}$	2	2 $\frac{1}{4}$	3	4
Diam.	1 $\frac{1}{2}$	1 $\frac{1}{4}$	2	2 $\frac{1}{4}$	3	4
Doz.	\$0.72	\$0.84	\$0.96	\$1.20	\$1.48	\$2.64
Each.	.08	.10	.12	.14	.16	.30



FIG. 1601. STEEL DOWEL PINS—BARBED.

Although intended to take the place of the Wooden Dowel Pins formerly used for pinning sash blinds and doors, their use may be suggested for many other purposes. We carry them in stock made from No. 8 steel wire (about $\frac{1}{16}$), and $\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, and 1 $\frac{3}{4}$ inches long. Price, per lb., 5 cts.



FIG. 1602. WIRE STAPLES AND TACKS.

We carry in stock a large variety of Clamp, Basket, Clinch, Bed Spring, and Blind Staples, also Double-pointed Tacks, of which we illustrate a number of styles. Price will be named upon application, stating style, size and quantity required.



FIG. 1603.

CORRUGATED STEEL FASTENERS.

These Fasteners are sold very extensively; they can be used for a great variety of purposes, such as fastening mitre and other joints, also in making boxes, etc.



NO. 3.

NO. 4.

NO. 5.

The number indicates the number of corrugations: No. 2 is $\frac{1}{2}$; No. 3, $\frac{1}{4}$; No. 4, $\frac{3}{4}$, and No. 5, 1 inch in width. In ordering, give length and number. Boxes contain 500 of a size.

PRICE LIST PER 1000.

No.	Length.				
	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$
2	\$0.41	\$0.45	\$0.53	\$0.57	\$0.68
3	.57	.64	.75	.87	1.02
4	.72	.81	.98	1.10	1.32
5	.90	.98	1.40	1.43	1.65

STEEL KNOBS.

FIG. 1605
NO. 1.FIG. 1606.
STYLE 5.FIG. 1607
STYLE 23.

These Knobs can be furnished in a great variety of styles and sizes from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter.

STEEL FERRULES.

FIG. 1608
NO. 110.FIG. 1609
NO. 112.FIG. 1610.
NO. 114.

We can furnish to order Steel Ferrules in great variety of styles and sizes.

Prices named upon application giving full particulars as to size and quantity.



FIG. 1611. BRASS FERRULES

No.	00	0	1	3	4	
Diam.	1	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	
Gross,	\$1.56	\$1.30	\$1.10	\$0.88	\$0.75	
Doz.	.18	.15	.12	.10	.09	
No.	5	6	7	8	9	10
Diam.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Gross,	\$0.65	\$0.55	\$0.45	\$0.45	\$0.45	\$0.45
Doz.	.08	.07	.06	.06	.06	.06



FIG. 1612. MACHINE HANDLE

These Handles are made from drop-forgings, require but little finishing, are accurate in size, and are neater in appearance and much cheaper than home-made handles.

No.	00	0	1	3
Each.	\$0.05	\$0.05	\$0.06	\$0.08
Lgth. over all,	2	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$
Diam. Shank,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Lgth.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
No.	3	4	5	6
Each,	\$0.10	\$0.12	\$0.14	\$0.16
Lgth. over all,	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$
Diam. Shank,	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Lgth.	$\frac{1}{2}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$

(22)

DROP-FORGED EYE BOLTS.

These are drop-forged from solid bar steel, made without welding. Especially designed for manufacturers of machinery, dynamos, ship-builders, etc.

We can furnish them threaded when desired. Write for prices.

PRICE LIST BLANK SHANKS.

Diam. Shank,	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2 in
Length "	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2 "
Inside of Eye,	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Each,	\$0.12	.14	.16	.21	.27
Diam. Shank,	$\frac{1}{2}$	1	$1\frac{1}{2}$	1 $\frac{1}{2}$	2 in
Length "	$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4 "
Inside of Eye,	$1\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$
Each,	\$0.37	.48	.60	1.52	3.20

BRASS CHECKS.

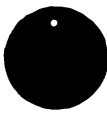


FIG. 1614.

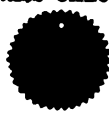


FIG. 1615.



FIG. 1616.

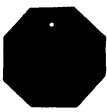


FIG. 1617



FIG. 1618.



FIG. 1619.

No.	Per 100.	Doz.	Size.	Style.
0	\$0.60	\$0.10	1	Fig. 1614
7	.70	.12	$1\frac{1}{2}$	" " no hole.
8	.70	.12	"	" " " "
12	1.00	.18	$1\frac{1}{2}$	" " 1620, no hole.
41	.60	.10	$\frac{1}{2}$	" " " "
3	1.15	.20	"	" " 1616
18	.90	.15	$1\frac{1}{2}$	" " " "
9	.80	.13	"	" " 1617, no hole.
10	.75	.12	1	" " " "
24	.60	.10	$\frac{1}{2}$	" " " "
19	1.60	.30	$1\frac{1}{2}$	" " " "
20	.85	.15	1	" " 1615
44	2.25	.40	2	" " 1618
40	6.00	.85	$3\frac{1}{2}$	" " " "
49	1.25	.25	$1\frac{1}{2} \times 1\frac{1}{2}$	" " 1619
39	1.85	.35	$1\frac{1}{2} \times 1\frac{1}{2}$	" " " "

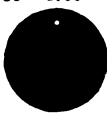


FIG. 1620.

We can furnish to order, other styles, also German Silver Checks and Umbrella Plates. Prices and description given upon application stating quantity.

RIVETS AND BURRS.

This style is called "Thousand Rivets." They are extensively used. We keep them both Black and Tinned in packages containing 1000 of a size.

PRICE PER PACKAGE.

Size,	3oz.	10oz.	12oz.	1 lb.	1 1/4 lb.	1 1/2 lb.
Black,	\$0.10	\$0.11	\$0.12	\$0.14	\$0.15	\$0.16
Tinned,	.12	.13	.14	.17	.19	.22
Size,	1 1/2	2	2 1/2	3	3 1/2	4 lb.
Black,	\$0.18	\$0.20	\$0.24	\$0.27	\$0.29	\$0.32
Tinned,	.24	.26	.32	.36	.40	.44
Size,	5	6	7	8	10	12 lb.
Black,	\$0.38	\$0.45	\$0.53	\$0.60	\$0.70	\$0.83
Tinned,	.53	.63				

ROUND HEAD RIVETS.

We carry in stock the following sizes: They are measured from under head to point: $\frac{1}{4}$ and $\frac{1}{2}$ diam. by $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4; $\frac{1}{4}$ and $\frac{1}{2}$ diam. by $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, $1\frac{1}{2}$, $1\frac{3}{4}$, 2. The $\frac{1}{4}$ Rivets, all lengths, are $5\frac{1}{2}$ cts. per lb.; the $\frac{1}{2}$ Rivets, all lengths, are $4\frac{1}{2}$ cts. per lb.

SMALL RIVETS.

We carry in stock a line of Round and Countersunk Head Rivets in the smaller sizes, as per following list. Diameters given are by English Wire Gauge. See page 419.

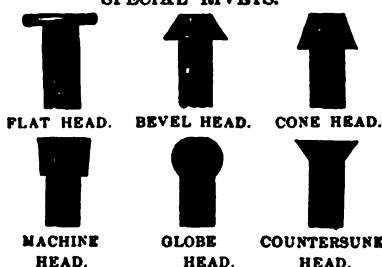
PRICE PER POUND.

Length,	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$ to 1 in.
Diam. No. 8	\$0.12	\$0.12	\$0.11	\$0.10
" " 10	.17	.16	.14	.12
" " 12	.21	.19	.17	.13
" " 14	.32	.30	.24	.16

While in the foregoing article we have given only the sizes and styles of Rivets we carry in stock, there are a number of styles of Rivets that, although intended for special purposes, are used to a sufficient extent as to warrant their being carried in stock by the manufacturers. Among these are Cooper's, Tinned Countersunk, Barrel, Shovel, Section, Trunk, Wagon-box, Boiler, etc., etc.

Manufacturers will be saved a great deal of annoyance and expense if they will, as far as possible, conform their work to staple or "stock" sizes. It is difficult to obtain Special Rivets in small quantities, although in this connection we might state that in very large quantities they can be furnished almost—if not quite—as cheaply as standard sizes.

SPECIAL RIVETS.



BLACK AND TINNED BURRS.

In packages containing one lb. Size of hole given by English Wire Gauge. See page 419.

Size,	3	6	8	10	12	14
Black,	\$0.14	\$0.17	\$0.20	\$0.21	\$0.25	\$0.27
Tinned,	.18	.20	.24	.25	.29	.31

COPPER RIVETS AND BURRS.

These are measured according to the English Wire Gauge. See page 419. They are made in all numbers from 5 to 15, but we carry in stock only the numbers as given in following table, and in length from $\frac{1}{2}$ to 1 inch. Packed in one lb. boxes, containing an equal number of Rivets and Burrs.

No.	6	8	10	12	14
Per Lb.	\$0.25	\$0.25	\$0.32	\$0.35	\$0.30

COPPER BURRS.

These are put up in one lb. boxes; for smaller quantities we charge at the rate of 5 cts. per oz.

No.	3	6	8	10	12	14
Per lb.	\$0.30	\$0.30	\$0.30	\$0.35	\$0.40	\$0.45

LELAND, FAULCONER & NORTON CO. LIGHT RIVETING MACHINE.

This Machine is designed for the rapid riveting of small rivets where it is important that the rivet be well headed without enlarging its body.

It is a well known fact among mechanics, that to spread the head of a rivet and draw the work tightly together, there must be light blows and a great many of them. It is possible to draw the head entirely off from the opposite end of a rivet by patient light hammering, while heavy blows will expand the rivet the entire length, spread the holes, and many times it will fall out when put to use.

It was to make it possible to get a great number of light blows in the same time

that one heavy blow is struck with the common hammer, that this machine was designed. It strikes from fifty to one

hundred blows per second, as preferred. This enables the operator, with one quick stamp of the foot, to give the rivet from seventy to eighty blows, and any rivet

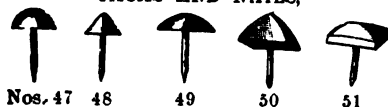
within the capacity of the machine can be headed in a second of time.

The force of the blow is due to the strength of treadle spring, and the amount of drop on cam wheel, and is adjustable by the hand wheel on under-side of machine; any blow from nothing to full force can be obtained. It is intended for rivets from the smallest to

$\frac{1}{4}$ diameter of brass or soft iron, but can be made effective for larger rivets in some cases. Is especially designed for use in the manufacture of clocks, locks, cash registers, type-writers, dress stays, toys, and any manufactured articles requiring light riveting.

Price, complete, \$75.00.

TACKS AND NAILS,



Nos. 47 48 49 50 51



Nos. 52 53 54 55 56 57 58

We carry in stock a very complete line of Tacks and Nails, comprising Black and Tinned Iron Tacks, Copper Tacks and Nails, Fancy Brass Nails in Glint, Nickel and other finishes, Trunk and Clout Nails, Finishing Nails, Brads, etc., etc.

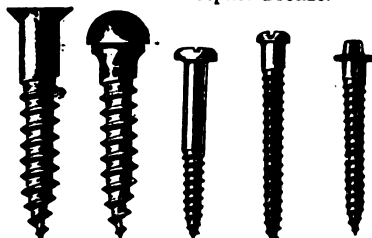
DO NOT Cut or Tear the pages of this book, as that destroys it for future reference. Order by figure number.

WOOD SCREWS.

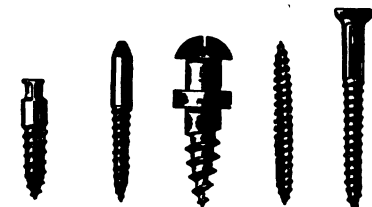
Changes in both list and selling prices of Wood Screws are of such frequent occurrence, that we deem it inexpedient to print prices.

We carry in stock a more than ordinary large line, comprising Flat Head Bright from $\frac{1}{4}$ in. No. 0 to 6 in. No. 24; Flat Head Brass, Round Head Brass, Round Head Blued, and Round Head Nickeled, from $\frac{1}{4}$ in. No. 0 to 3 in. No. 20. Prices on any desired style of Screws will be named upon application stating quantity.

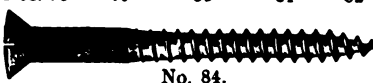
We can furnish to order Flat and Round Head Screws in Iron, Bright, Blued, Japanned, Tinned, Lacquered, Bronzed, Brass, Copper, Nickel or Silver-plated. Brass Screws Lacquered, Bronzed, Silver and Nickel-plated; also Screws made of Solid Bronze and Phosphor Bronze.



Nos. 73 74 75 76 77



Nos. 78 79 80 81 82



No. 84.

FIG. 1631. SPECIAL WOOD SCREWS.

The above cuts illustrate quite a variety of special forms of Wood Screws. These are made to order only, and cannot be furnished in small quantities. Prices will be named upon application giving exact dimensions and quantity required.

MATHEMATICAL INSTRUMENTS AND SUPPLIES.*

In selecting our line of Instruments and Supplies, we have had one purpose in view, to which all others have been made subservient—that is—to select only the best goods in each respective class, it is possible for us to obtain.

There is probably no line in our whole business in which so much chance for deception occurs as in this, and it always has been, and is now, our aim to present goods exactly as they are. To this we owe, to a great extent, our constantly increasing trade in this line.

The following pages contain, in a very condensed form, a partial list of the goods of this line which we carry in stock, but those illustrated and described here are by no means all that we can supply. We are constantly adding to our line, and it would be impossible to illustrate (neither have we the space) our entire line of these goods.

SWISS INSTRUMENTS.

Our Instruments have been selected with a view to having only the most useful and necessary, and as coming first, being the best, we have selected the justly celebrated Swiss Instruments, all fitted with the Altener Pivot Joint, which is without doubt, the best joint that was ever used in any instrument. The material from which these instruments are made is rolled German silver plate, and are the only ones made in this way. The rolling of the metal insures perfect density and hardness. To work this hard-rolled material, naturally requires more time and expense in fitting up the different parts, than to simply polish and buff the cast parts that are used in many other instruments, claiming to be "Just as good." The steel parts are hand-forged from English steel.

These Instruments are the result of years of experience in manufacturing, and the designs are the result of many experiments and suggestions of numerous professional men.

*"The loss of time arising from the use of inferior instruments, sometimes amounts to more in a single year than the cost of a full set of the best instruments made."—*Points about Drawing Instruments.*

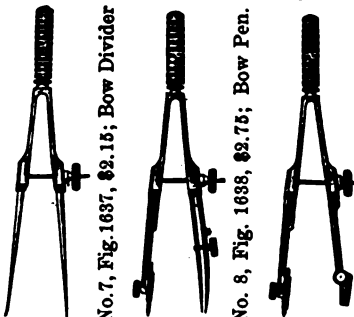
The accompanying cut, Fig. 1632, will give a very good idea of the Joint used in the Swiss Instruments. The sides of the Joint are scraped to a surface, and are held in position by a yoke, through which two pointed set-screws pass, and they in turn are held to position by smaller screws, making it, without doubt, the best Joint for a drawing Instrument.

1632



- No. 2. No. 3. No. 4. No. 5.
FIG. 1633. FIG. 1634. FIG. 1635. FIG. 1636.
No. 1, \$2.05; Plain Divider.
No. 2, \$2.70; Hairspring Divider.
No. 3, \$5.40; Compass, with Pen, Pencil and Needle Points.
No. 4, \$6.30; Compass, with Pen, Pencil and Fixed Needle Point.
No. 5, \$3.20; Pen, with Fixed Points.
No. 6, \$3.20; Pencil, with Fixed Points.

The above Instruments are 4½ in. long.



Nos. 7, 8 and 9 are 3½ inches long.

The Instruments shown and described on pages 456 and 457 embody the ones most commonly used. They are made of the best material and workmanship, and are guaranteed to be superior tools.

We solicit correspondence on other tools not shown in this catalogue.

No. 16, Plain Bow Divider, \$2.50; is the same size and style as Fig. 1640.

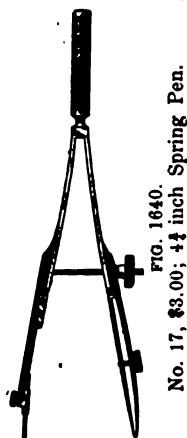


FIG. 1640.

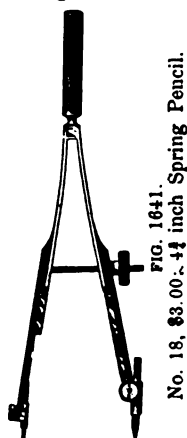
No. 17, \$3.00; $\frac{1}{4}$ inch Spring Pen.

FIG. 1641.

No. 18, \$3.00; $\frac{1}{4}$ inch Spring Pencil.

No. 19, \$9.50; Nos. 16, 17 and 18 in case.
 " 10, 2.50; Fig. 1644, 6 in. Plain Divid.
 " 11, 2.90; " 1644, 7 " "
 " 12, 3.15; " 1645, 6 " Hair Sp'g"
 " 13, 3.60; " 1645, 7 " "



FIG. 1642.

Plain Spring Pen, \$3.60.



FIG. 1643.

Plain Spring Pen and Pencil combined,
\$4.50.

We desire to call attention to Figs 1642 and 1643. These are especially useful on bolt and rivet work or where numbers of small circles are to be made



FIG. FIG. FIG. 1646.

1644. 1645. NO. 14. FIG. 1647. NO. 15.

No. 14, \$7.00; Fig. 1646, 6 in. Compass, with Pen, Pencil, Fixed Needle Point and Lengthening Bar.

No. 15, \$7.75; Fig. 1647, 6 in. Compass, with Pen, Pencil, Needle Points, and Lengthening Bar.

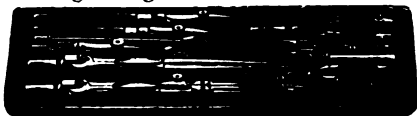


FIG. 1648. SET NO. 20.

SWISS INSTRUMENTS, IN CASE, \$21.50.

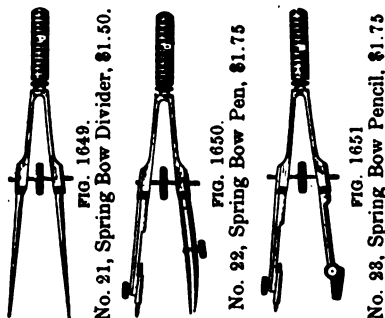
Our Swiss Instruments are put up in a variety of sets, more or less complete. We have selected Fig. 1648 as the most desirable to show, as it contains all the more important and useful tools, and is recommended on this account.

This set contains 1 pair Compasses, No. 14; 1 Divider, No. 12; 1 each, Bow Instrument, Nos. 7, 8, 9; and 1 each, $\frac{1}{4}$ and 5 in. Ebony Handle Drawing Pen.

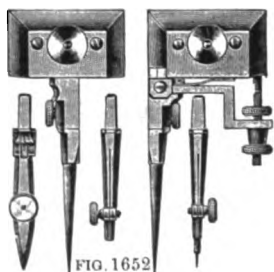
SUPERIOR GERMAN INSTRUMENTS.

Coming after the Swiss in point of quality and usefulness, is our line of Superior German Instruments. They are also made with a pivot joint, and very closely resemble the former. They will, in most cases, do the work of the foreman, machinist, pattern-maker, carpenter or other mechanic quite well enough, where the extreme accuracy expected of the draughtsman or designer is not required.

Where the mechanic is an enterprising fellow, and likes to lay out any piece of work given him, and be sure he is right (on such work as is not laid out in detail for him), these Instruments are especially desirable.



No. 24, \$5.00; set of above in case



Price \$6.75; in neat Morocco case, \$7.25.

The Beam Compass, shown above, will fit any regular size straight edge, and is made adjustable by means of a screw, as shown, by which it may be set very accurately. Made of German silver, has two Steel Points, Pen, Pencil, and Needle Point.



No. 26, \$1.50; $\frac{1}{4}$ inch Plain Divider.

" 27, 1.75; 6 " " "

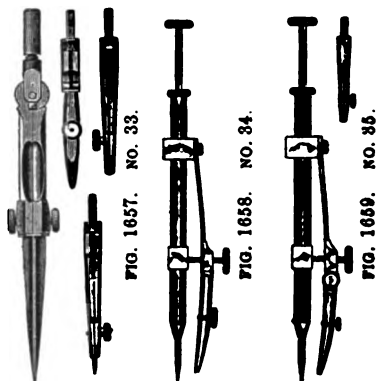
" 28, 2.00; 6 " " Hair Spring Divider

" 29, 2.50; 4 " " " "

" 30, 3.00; $\frac{1}{4}$ " " Compass, with Fixed Needle and Pencil Point.

No. 31, \$3.00; $\frac{1}{4}$ in. Compass, with Fixed Needle and Pen Point.

No. 32, \$3.60; $\frac{1}{4}$ in. Compass, with Pen and Pencil Points, and Fixed Needle Point.



No. 33, \$4.25; $\frac{1}{4}$ in. Compass, with Pen Pencil and Needle Point.

No. 34, \$2.25; Spring Bow Pen.

No. 35, \$3.00; Spring Bow Pen, with Pencil Point.

We recommend the above tools for small and rapid work.

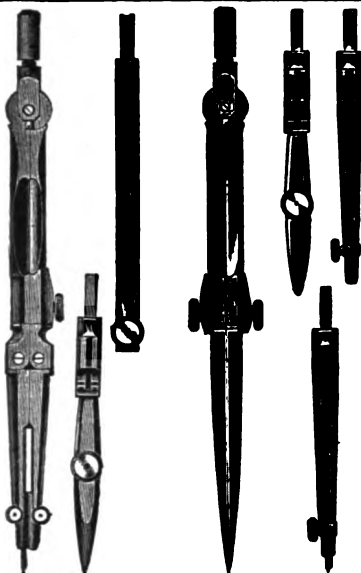


FIG. 1660. NO. 36. FIG. 1661. NO. 37.
No. 36, Fig. 1660; price, \$5.00. Compass, 6 in. long; with Pen and Pencil Points, Lengthening Bar, and Fixed Needle Point.

No. 37, Fig. 1661; price, \$5.75. Compass, 6 in. long; Pencil, Pen and Needle Points and Lengthening Bar.



FIG. 1662. NO. 38.

This Set contains Ruling Pen No. 84, 4 in.; No. 26, Plain Divider; No. 33 Compass, and Box of Leads. Price, \$7.50



FIG. 1663. NO. 39.

Contains Ruling Pen, No. 87, 5½ in.;

No. 27, Plain Divider, 6 in.; No. 36, Compass, 6 inch, Box of Leads. Price, \$9.00.

All Superior German Compasses and Dividers are fitted with Pivot Joints.



FIG. 1664. SET NO. 40. Price, \$10.50.

Set No. 40 contains Ruling Pens Nos. 73 and 74; Spring Bow Pen, 3½ in.; Plain Divider, No. 27; Compass, No. 36; Box of Leads.

The Spring Bow Pen in this case is not illustrated, but is the same in quality as No. 23 and same style as No. 8.



FIG. 1665. SET NO. 41. Price, \$12.50.

Set No. 41 contains Ruling Pens Nos. 73 and 74; Spring Bow Divider, Pencil and Pen, 3½ in. each; Hairspring Divider, No. 29; Compass, No. 36; Box of Leads.

This Set is a duplicate of No. 20, except that the instruments are Superior German instead of Swiss, and it is the most popular set we have. The Bow Instruments are the same as in No. 40.



FIG. 1666. SET NO. 42. Price, \$18.25.

Set No. 42 contains Ruling Pens, Nos. 73 and 87; Spring Bow Divider, Pencil and Pen, 3½ in. each; Hairspring Divider, No. 29; Compasses, Nos. 33 and 37; Box of Leads.

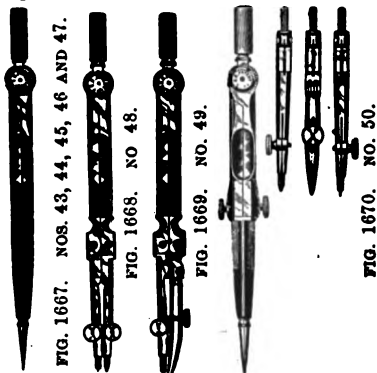
This is the most complete Set we have, and comprises all the most used instruments. The Bow Instruments in this set are the same as in Sets Nos. 40 and 41. They all have Metal Handles and the quality is first-class.

We can furnish any assortment in Morocco Cases at short notice.

Our most popular line for general purposes

FINE GERMAN INSTRUMENTS.

These Instruments are next in quality to the Superior German, shown on the preceding pages. They are fitted with a Flat Joint, and will, in many cases, take the place of the higher-priced tools. We recommend them especially to students and mechanics who do not, from the nature of their work, require the more expensive instruments.



- No. 43, \$0.90; $3\frac{1}{4}$ in. Divider, with Handle
 " 44, .75; 5 " " " "
 " 45, 1.00; 6 " " " "
 " 46, 1.50; 5 " " Hair Spring.
 " 47, 1.75; 6 " " "
 " 48, 2.00; $3\frac{1}{4}$ " Pencil, Fixed Points
 " 49, 2.00; $3\frac{1}{4}$ " Pen, "
 " 50, 2.50; $3\frac{1}{4}$ " "Pencil, Need. Pts.

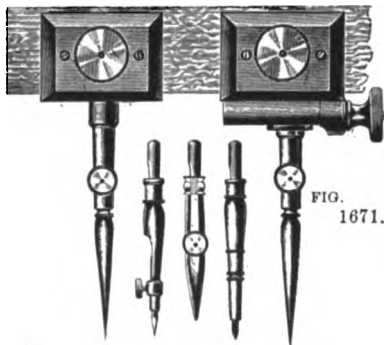


Fig. 1671, Beam Compass, to fit any straight edge; with two Steel Points, Pencil, Pen, and Needle Points. Price, per case. \$6.50.



No. 51, ea. \$2.70; Compass, $5\frac{1}{4}$ in. with Fixed Needle P't, Pen, Pencil, and Lengthening Bar.

FIG. 1672. NO. 51. FIG. 1673. NO. 52. No. 52, each, \$3.00; Compass, $5\frac{1}{4}$ in., with Pen, Pencil and Needle Points, and Lengthening Bar.

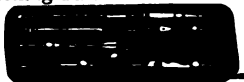


FIG. 1674. NO. 53.

Set No. 53, price \$4.00; contains one Instrument, No. 50; one 4 inch Ruling Pen; one Box Leads.

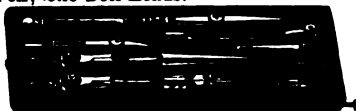


FIG. 1675. NO. 54.

Set No. 54, price \$4.75; contains one Instrument, No. 44; one Instrument, No. 51; one $5\frac{1}{4}$ inch Ruling Pen, Jointed; one Box Leads.



FIG. 1676. NO. 55.

Set No. 55, price \$6.50; is the same as No. 54, with Bow Pen added.

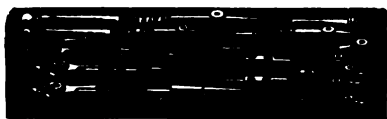


FIG. 1677. SET NO. 56.

Set No. 56 contains one Instrument No. 52; one Instrument No. 50; one Instrument No. 44; one 5½ in. Ruling Pen, with Joint and Pin; one 4 in. Ruling Pen, with Joint; one Box of Leads; one Key. Price, complete, \$8.50.

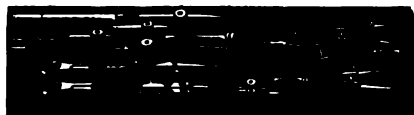


FIG. 1678. SET NO. 57.

Set No. 57 contains one Instrument No. 51; one Instrument No. 46; one Steel Bow Divider; one Steel Bow Pencil; one Steel Bow Pen (all Bows are 3½ inches long); one 5½ inch Ruling Pen, with Joint and Pin; one 4 inch Ruling Pen, with Joint; one Box of Leads; one Key. Price, complete, \$9.50.



FIG. 1679. SET NO. 58.

Set No. 58 contains one Instrument No. 53; one Instrument No. 50; one Instrument No. 46; one Steel Bow Divider; one Steel Bow Pencil; one Steel Bow Pen (all Bows are 3½ inches long); one 5½ in. Ruling Pen, with Joint and Pin; one 4 inch Ruling Pen, with Joint; one Box of Leads; one Key. Price, complete, \$12.50.

GERMAN INSTRUMENTS.

We show here a grade of German instruments similar in pattern to the fine German Instruments just described, but they are carried only in sets. Their low price and fair quality make them very desirable sets for those who cannot or do not care to buy the more expensive ones. They are used a great deal in school work, and are much better than any of the brass instruments that are made and usually sold for this purpose.

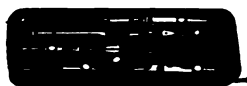


FIG. 1680. SET NO. 59.

Set No. 59 contains one 3½ in. Compass, with Pencil and Needle Point; one 4 inch Ruling Pen; one Box of Leads; one Key. Price, \$3.25.

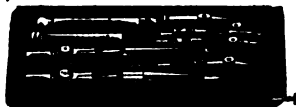


FIG. 1681. SET NO. 60.

Set No. 60 contains the same Instruments as No. 59, with the addition of one 3½ inch Plain Divider. Price, \$3.75.

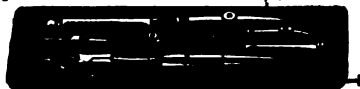


FIG. 1682. SET NO. 61.

Set No. 61 contains one 5½ inch Compass, with Pencil and Pen Point only; one 5½ inch Ruling Pen; one Box of Leads and Key. Price, \$2.75.

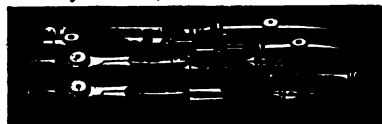


FIG. 1683. SET NO. 62.

Set No. 62 contains the same Instruments as No. 61, with the addition of one 5 inch Plain Divider. Price, \$3.10.

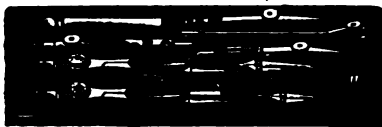


FIG. 1684. SET NO. 63.

Set No. 63; same as No. 62 with addition of Lengthening Bar, and one 5½ inch Compass. Price, \$3.50.

All sets are shown without covers to save space, but each set comes in a nice case with cover, as shown in Figs. 1669 and 1663.

THIS BOOK is copyrighted and we caution all parties against using, without our written permission, any of the original matter contained herein.

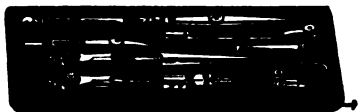


FIG. 1685. NO. 64.

No. 64 contains one Compass with Fixed Needle Point and Pencil, Pen Points and Lengthening Bar; one 5 inch Plain Divider; one $5\frac{1}{2}$ inch Ruling Pen, with Joint; one Box Leads and Key. Price, \$3.70.

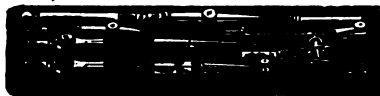


FIG. 1686. NO. 65.

No. 65 is the same as No. 64, with the addition of one $3\frac{1}{4}$ inch Spring Bow Pen. Price, \$4.75.

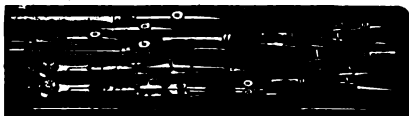


FIG. 1687. NO. 66.

No. 66 contains one $5\frac{1}{2}$ inch Compass, Fixed Needle Point and Pen, Pencil, and Lengthening Bar; one 5 inch Hairspring Divider; one Steel Spring Bow Divider, $3\frac{1}{2}$ in.; one Steel Spring Bow Pencil, $3\frac{1}{2}$ in.; one Steel Spring Bow Pen, $3\frac{1}{2}$ in.; one Ruling Pen, with Joint, 4 in.; one Ruling Pen, with Joint, 5 in.; one Box Leads and Key. Price, \$8.50.



FIG. 1688. NO. 67.

No. 67 contains the same instruments as No. 66, with the addition of one $3\frac{1}{4}$ in. Compass, with Pencil, Pen and Needle Point. Price, \$10.50.

NICKEL PLATED SCHOOL INSTRUMENTS.

This line of low-priced Instruments is a great improvement over the French Instruments, almost universally sold for this purpose. Carried only in sets.

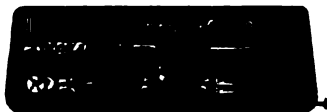


FIG. 1689. NO. 68.

No. 68 contains Compass, $4\frac{1}{2}$ in., with Pencil and Pen Points, Key and Lead Box. Price, \$0.85.



FIG. 1690. NO. 69.

No. 69 contains Compass, $5\frac{1}{2}$ in., with Pencil and Pen Points, and Ruling Pen. Price, \$1.35.



FIG. 1691. NO. 70.

No. 70; same as No. 69, with addition of Lengthening Bar. Price, \$1.70.



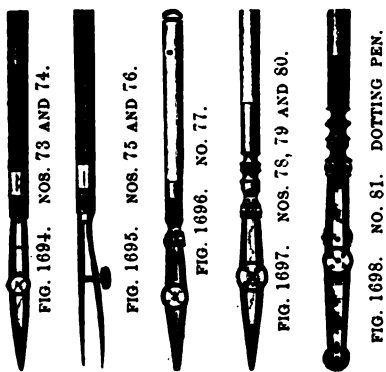
FIG. 1692. NO. 71.

No. 71 contains $5\frac{1}{2}$ in. Compass, with Pen and Pencil Points, Lengthening Bar, $4\frac{1}{2}$ in. Dividers, Ruling Pen, Leads, etc. Price, \$2.00.

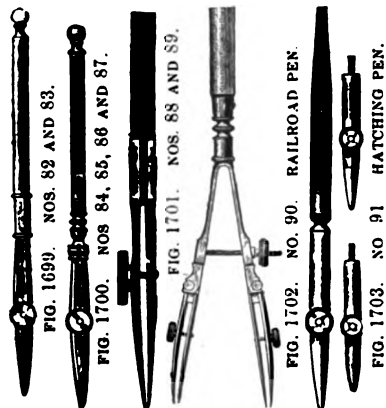


FIG. 1693. NO. 72.

No. 72 contains same Instruments as No. 71, with the addition of Spring Bow Pen. Price, \$3.00.



No. 73,	\$1.00;	Ebony Handle,	4½ in. long.
" 74,	1.10;	"	" 5 " "
" 75,	1.15;	"	" 4½ " "
" 76,	1.25;	"	" 5 " "
" 77,	1.40;	Ivory	" 4 " "
" 78,	1.60;	" H'dle,	4½ in., with Pin.
" 79,	1.80;	"	" 5½ " "
" 80,	2.00;	"	" 6½ " "
" 81,	4.25;	"	" 6 " 6 Wheels.



No. 82,	\$0.40;	4 in. long, no Joint.
" 83,	.45;	5 " " "
" 84,	.70;	4 " " Fine Joint.
" 85,	.75;	5½ " " "
" 86,	.80;	4½ " " " with Pin.
" 87,	.90;	5½ " " " "
" 88,	1.20;	5 " " For long lines.
" 89,	1.40;	6 " " " "
" 90,	2.25;	5½ " " Both Pens Joint'd
" 91,	1.65;	6 " " 3 Pens to 1 H'dle

DRAWING PAPERS.

DETAIL PAPER is made cold-pressed with slightly grained surface. Will stand a fair amount of erasing, and take pencil or India ink drawings very nicely. Full rolls weigh from 100 to 120 lbs.

BUFF PAPER is as its name implies, Buff in color. Is especially intended for preliminary and general drawings. In working on this color, it does not tire the eyes. It will also admit of a great deal of handling, without soiling or cracking, and stand erasing perfectly. Full rolls weigh from 30 to 35 lbs.

GENERAL—The color of this Paper is white, and of the same quality as the Buff. Used largely for general office and school work.

PEERLESS—This is our best grade of Paper, white in color, with a surface commonly known as Egg-shell. These Papers are so well known that further description is unnecessary.

BLUE PRINT PAPER—We carry in stock the Prepared and Unprepared of the very best quality.

TRACING CLOTH AND PAPER—Both of these are the very best goods we can buy, and always uniform in quality.

MOUNTED PAPERS—We carry in stock the General and Peerless grades, Mounted on Muslin.

Kind.	Width Inches.	Per Yd.	10 Yd. Roll.	In Rolls about	Per Lb.
Detail,	36	\$0.10	\$0.75	100 lbs.	\$0.12
"	48	.12	.90	100 "	.12
Ruff,	36	.15	1.21	30 "	.25
"	62	.30	2.30	40 "	.25
General,	36	.22	1.80	30 "	.35
"	62	.35	3.00	40 "	.35
Peerless,	36	.35	2.85	40 "	.45
"	58	.45	4.20	40 "	.45
General	36	.80	6.50		
Mounted,	58	1.20	10.25		
Peerless,	36	1.00	7.85		
Mounted,	58	1.40	11.75		

PREPARED BLUE PRINT PAPER.

SOLD ONLY IN FULL ROLLS

Width, Inches,	24	27	30	36	42
10 Yd. Rolls, ea.	\$0.90	1.00	1.15	1.30	1.60

TRACING CLOTH.

Width Inches,	30	36	42	54
Price, per Yd.,	\$0.35	\$0.40	\$0.50	\$0.75
24 Yd. Rolls,	6.20	6.85	9.45	13.50

TRACING PAPER—Owing to the great variety we have not listed them. Will send small Sample Book of all kinds of Paper upon receipt of 3c for postage.

SUPPLIES.

On the following pages we list our line of Draughtsmans' Supplies, which, like our Instruments, embraces only the most used and essential. All of this line is selected with especial care as to quality, and in each class we aim to have the best.

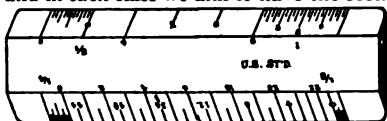


FIG. 1704. DRAUGHTSMANS' FLAT SCALE.

Fig. 1704 represents the most common form of Flat Scales. These are made of boxwood, and divided $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch to the foot, U. S. Standard.

Length, in. 6 12 18 24
Price, each, \$0.35 \$0.50 \$1.00 \$1.50

This style of Scale is also made divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 3 inches to the foot. Prices same as above.

We can also furnish the above style of Scale with white edges, which are very desirable, as the divisions are much more easily read.

PRICES OF WHITE EDGED SCALES

Length, in. 6 12 18 24
Price, each, \$0.85 \$1.25 \$2.25 \$3.00

FLAT ENGINEERS' SCALES.

These Scales are divided into 10ths, as follows: 10x50, 10x30, 20x40, 30x60, 40x80, 50x100, and 80x100 parts to the inch. These are made 6 and 12 inches long only, with either plain or white edges. Prices same as above for corresponding kind.



FIG. 1705. TRIANGULAR SCALES.

Triangular Scales are too well known to need any further description. They are graduated $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$, and 3 inches to the foot, and on one edge to 16ths of an inch.

No. 1, 6 inches long, \$0.90 each, Plain Boxwood.

No. 2, 12 inches long, \$1.25 each, Plain Boxwood.

No. 3, 12 inches long, \$2.70 each; with White Edges.

No. 4, 12 inches long, \$2.70 each, Metallic.

The above Scales graduated for Engineers' use at the same prices as their corresponding kinds.

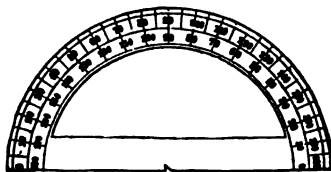


FIG. 1706. PROTRACTOR.

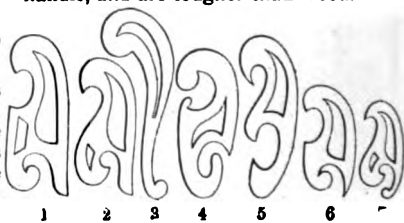
No.	Each.	Diam.	Divisions.	Kind.
1	\$0.15	4 $\frac{1}{2}$ in.	1 deg.	Horn.
2	.30	6 $\frac{1}{2}$ "	$\frac{1}{2}$ "	"
3	.10	3 $\frac{1}{2}$ "	1 "	Brass.
4	.50	5 $\frac{1}{2}$ "	$\frac{1}{2}$ "	"
5	.60	4 $\frac{1}{2}$ "	1 "	Germ. Silver
6	1.10	6 $\frac{1}{2}$ "	$\frac{1}{2}$ "	"
7	1.60	4 "	1 "	"
8	2.75	6 "	$\frac{1}{2}$ "	"
9	5.25	8 "	$\frac{1}{2}$ "	"

See the New Steel Protractor on page 32.

CURVES.

TRANSPARENT AMBER CURVES.

These are fast coming into general use, as their transparency is very advantageous for the class of work for which they are designed. They are much cleaner to handle, and are tougher than wood.



1 2 3 4 5 6



8 9 10 11 12

FIG. 1707 WOOD AND AMBER CURVES.

No.	1	2	3	4	5	6
Wood, each, \$0.35	.30	.35	.35	.35	.35	.30
Amber, "	.65	.50	.65	.65	.65	.60
No.	7	8	9	10	11	12
Wood, each, \$0.25	.35	.25	.35	.35	.35	.35
Amber, "	.60	1.00	.40	.70	.65	.50

FIG. 1708. STRAIGHT EDGE.

These are all made of Mahogany and Ebony lined.

L'gth, inches, 24 30 36 48 60 72
Square Edge, \$0.50 .60 .70 1.20 1.40 1.65

T SQUARES.

We carry in stock such Squares as meet the most general demand. Can furnish various other kinds and qualities. Our Squares are of two classes; Plain and Swivel Head, lined and unlined. They are made of three different kinds of woods, viz: Cherry, Ash and Mahogany.

The Ash Squares are lined with Maple and have Walnut heads; the Mahogany are lined with Ebony, and are the best Squares for general use, as they are less liable to warp or get out of shape.

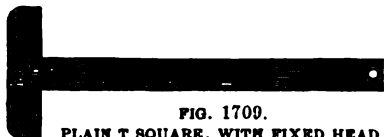


FIG. 1709. PLAIN T SQUARE, WITH FIXED HEAD.

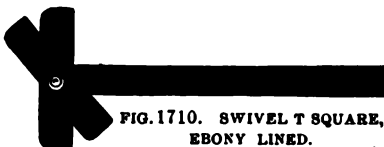


FIG. 1710. SWIVEL T SQUARE, EBONY LINED.

PRICES OF PLAIN T SQUARES.

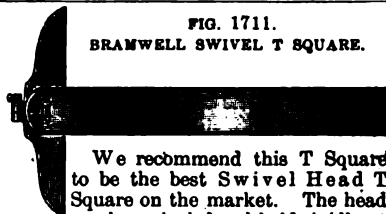
L'gth, inches,	15	18	21	24	30
Cherry, ea.	\$0.23	\$0.25	\$0.30	\$0.35	\$0.40
Ash, "	.30	.35	.45	.55	.65
Mahog'y"	.45	.55	.65	.75	.85
L'gth, inches,	36	42	48	60	
Cherry, ea.	\$0.50				
Ash, "	.80	\$1.00	\$1.20	\$1.60	
Mahog'y"	1.00	1.20	1.35	1.75	

PRICES OF SWIVEL T SQUARES.

L'gth, inches,	15	18	21	24	30
Cherry, ea.	\$0.55	\$0.70	\$0.75	\$0.80	\$0.90
Mahog'y"	.80	.90	1.00	1.20	1.35
L'gth, inches,	36	42	48	60	
Cherry, ea.	\$1.00				
Mahog'y"	1.50	\$1.70	\$1.90	\$2.40	

We can furnish T Squares lined with Transparent Amber, but the long strips are apt to warp and we do not consider them very reliable.

FIG. 1711. BRANWELL SWIVEL T SQUARE.



We recommend this T Square to be the best Swivel Head T Square on the market. The head can be swiveled and held rigidly at any point of angle. They have a mahogany blade, ebony lined.

L'gth, 24 30 36 42 48 60 72
Each, \$2.00 2.25 2.50 2.75 3.00 3.50 4.00

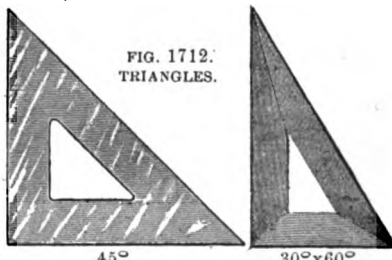


FIG. 1712. TRIANGLES.

TRANSPARENT AMBER, JOINED WOOD.

We carry in stock Triangles, made in the same kinds of wood as the T Squares described in opposite column.

TRANSPARENT AMBER TRIANGLES.

These are fast taking the place of the Rubber and Wooden Triangles previously sold, as they are cleaner to handle, tougher in material and are transparent, which is very advantageous for general use. Their value can only be appreciated by using them.

PRICE LIST OF 45° TRIANGLES.

Size, In.	Cherry.	Mahogany.	Amber.
5	\$0.17	\$0.35	\$0.50
7	.22	.45	.75
9		.60	1.00
10	30	70	1.20
12		.85	1.75
14		1.10	2.20
16		1.50	2.80

PRICE LIST OF 30° x 60° TRIANGLES.

Size, In.	Cherry.	Mahogany.	Amber.
5	\$0.15	\$0.30	\$0.35
7	.20	.40	.55
9	.25	.50	.70
10	.28	.60	.80
12	.30	.75	1.20
14		1.00	1.60
16		1.20	2.00

"Amber" goods are clean and convenient.

THUMB TACKS.



FIG. 1713. ROUND. FIG. 1714. BEVELED.

The above represent our best Thumb Tacks. These are hand-made, of German Silver, having hardened steel points of proper length and thickness. They are screwed into the heads and riveted; will not break or bend easily. The heads of these Tacks are very thin, which will be of advantage in using the T square.

ROUND HEADS.

	Per Doz.	Diam.
No. 1	\$0.60	$\frac{1}{8}$ in.
" 2	.75	$\frac{1}{4}$ "
" 3	.90	$\frac{3}{8}$ "

" 4 1.25; is made from solid steel, $\frac{1}{4}$ inch in diameter.

BEVELED HEADS.

	Per Doz.	Diam.
No. 5	\$0.60	$\frac{1}{8}$ in.
" 6	.75	$\frac{1}{4}$ "
" 7	.90	$\frac{3}{8}$ "

THUMB TACKS WITH RIVETED STEEL POINTS.

These Tacks are not equal in quality to our best, but are very good. Furnished with Round or Beveled Heads.

GERMAN SILVER.

	Per Doz.	Diam.
No. 1	\$0.25	$\frac{1}{8}$ in.
" 2	.30	$\frac{1}{4}$ "
" 3	.50	$\frac{3}{8}$ "

BRASS.

	Per Doz.	Diam.
No. 4	\$0.15	$\frac{1}{8}$ in.
" 5	.25	$\frac{1}{4}$ "
" 6	.35	$\frac{3}{8}$ "

PUNCHED STEEL TACKS.



These Tacks are made of Punched Sheet Steel, and are meeting with great favor. Their chief recommendation is the low price at which they are sold.

	Per 100.	Per Doz.	Diam.
No. 1	\$0.50	\$0.08	$\frac{1}{8}$ in.
" 2	.70	.10	$\frac{1}{4}$ "
" 3	1.00	.12	$\frac{3}{8}$ "

We can furnish the above style Tacks with covered heads (protecting the thumb from injury in case the points should accidentally break off and push through), at the following prices. These also are better finished and Nickel Plated:

	Per 100.	Per Doz.	Diam.
No. 1	\$0.90	\$0.10	$\frac{1}{8}$ in.
" 2	1.10	.15	$\frac{1}{4}$ "
" 3	1.40	.20	$\frac{3}{8}$ "

FIG. 1716. THUMB TACK LIFTER. 25c each.



FIG. 1717.

Fig. 1717, \$0.15 each; Pl'n Horn Centers.
" 1718, .50 " Silver Rim "



FIG. 1718.



FIG. 1719.

DRAWING INK.

The use of Liquid India Inks has to a great extent superseded the old Stick form, and we believe it is more desirable for general use.

Higgins' Inks are made in two classes, viz: Water Proof and General. The Water Proof Ink is the best to use when drawings are apt to get damp or wet, as

it will not run or blur. The General Ink is used for regular office drawings, and is made in various colors, viz: Carmine, Scarlet, Vermillion, Brick-red, Blue, Green, Violet, Indigo, Brown, Yellow and Orange.

Price per bottle, any color, \$0.25; per doz., \$2.50.

To dilute the Black inks, use distilled water, with a little aqua ammonia; four drops to the ounce of water.

To dilute Colored inks, use distilled water only. Never add any acid or mix with other Inks.

ERASERS FOR PENCIL AND INK.

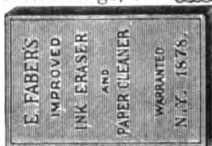
FIG. 1720.

Size.	Each.
Small,	\$0.10
Medium,	.16
Large,	.20
Extra Large,	.40



FIG. 1721.

INK ERASER.



Size.	Each.
Small,	\$0.05
Medium,	.10
Large,	.20



FIG. 1722.

Each, \$0.06	\$0.10	\$0.15
Size, Small,	Medium,	Large,

PENCILS.



FIG. 1723.

Fig. 1723, Artist's Pencils; per doz., \$1.00; each, 10 cts.



FIG. 1724.

Fig. 1724, Siberian Leads, $\frac{1}{2}$ doz. in box, 65 cts.



FIG. 1725

Fig. 1725, Artists' Holder; No. 1, as shown, 25c each; No. 2, Double Pointed, 35 cts. each.

The A. W. Faber Pencils and Leads are generally conceded to be the best goods of this class made. We carry these in stock in thirteen different grades, as follows: 6-B (very soft and very black), 5-B, 4-B, 3-B (soft and black), 2-B, B, HB (medium), H, 2-H, 3-H (quite hard), 4-H, 5-H, 6-H (very hard).

All grades are the same price.

BLUE PRINT FRAMES



FIG. 1726

These Blue Print Frames are made of Hardwood and nicely finished, have Brass Mountings. With or without Felt Cushions or Polished Plate Glass.

No.	Size.	Frame only.	With Felt Cush.	With Pol. Pl. Glass.
100	18 x 22	\$6.13	\$8.23	\$10.96
101	20 x 24	6.58	9.07	12.71
102	24 x 30	7.88	11.76	17.08
103	30 x 42	10.50	17.08	29.40
104	36 x 60	19.25	30.52	58.49

BATH TRAYS FOR BLUE PRINT FRAMES.

These are zinc trays with drain pipes; strong wired rim and hardened braces.

No.	110	111	112	113	114
Size,	18x22	20x24	24x30	30x42	36x60
Each,	\$3.43	\$3.96	\$4.73	\$6.30	\$8.40

FRY'S PATENT DRAUGHTING TABLE.

We illustrate here what we believe is the best and most practical Draughting Table ever placed upon the market. This Table can be instantly adjusted to any elevation required, either horizontally or at any angle of inclination. It stands firmly in any position, is simple, well made, and finely finished.

PRICE LIST.

30x36 in., complete,	\$20.00
37x48 in. "	25.00
37x56 " "	30.00
40x72 " "	35.00

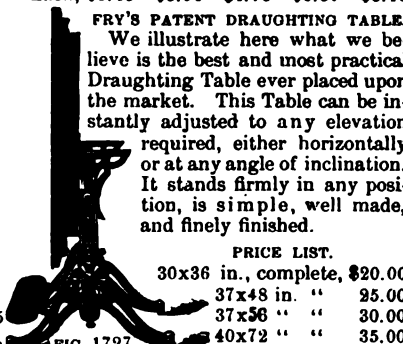
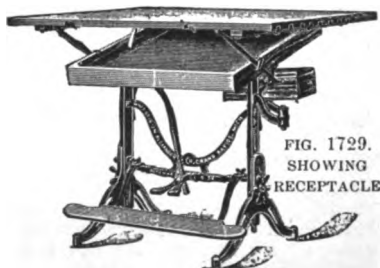


FIG. 1727

FIG. 1728.
TABLE
AS USED.FIG. 1729.
SHOWING
RECEPTACLE

POCKET KNIVES.

We carry in stock some two hundred varieties of Pocket Knives, and yet at least 50 per cent of our sales are of the patterns shown here. They are not "polished with diamond dust", are not "file-tested", are not made of "razor steel", nor will they "split a hair". They are, however, of the highest quality, are handsomely finished, are the same brands and styles that we have sold for twenty-five years, and if your dealers are not able to satisfy you, we would be pleased to sell you. The prices include postage.



Fig. 1730 is a light Pen-knife, suitable for either ladies' or gentlemen's use; length when closed, $2\frac{1}{2}$ inches; has three blades. Ivory or Stag handle, \$0.90; Tortoise Shell, \$1.15; Pearl, \$1.25.

Medium Pen-knife, style of Fig. 1730; length when closed, $3\frac{1}{2}$ inches. Ivory or Stag handle, \$1.10; Tortoise Shell, \$1.30; Pearl, \$1.45.



FIG. 1737.

Fig. 1737 represents an Electricians' knife. This is an uncommonly useful tool for those who do electrical work. It has one regular knife blade, and another blade especially for scraping wire. This blade has also a sharp edge for cutting the covering of wire, and forms a substantial screw driver. Length of handle, $3\frac{1}{2}$ in.; length of blade, $2\frac{1}{2}$. Price, \$0.85.

Fig. 1731, medium Pen-knife; length, $3\frac{1}{2}$ inches. Ivory, Horn or Stag handle, two blades, \$0.70; three blades, \$0.95. Pearl, two blades, \$1.00; three blades, \$1.35.

Heavy Pen-knife, style of Fig. 1731; length, $3\frac{1}{2}$ inches. Ivory, Horn or Stag handle, two blades, \$0.95; three blades, \$1.20. Pearl, two blades, \$1.35; three blades, \$1.75.

Fig. 1732 is a heavy Pen-knife; length, $3\frac{1}{2}$ in. Ivory, Horn or Stag handle, \$1.00, Pearl, \$1.40.

Fig. 1733 is a heavy Pen-knife; length, $3\frac{1}{2}$ in. Ivory, Horn or Stag handle, \$1.00; Pearl, \$1.50.

Fig. 1735 is a light Jack-knife; length, $3\frac{1}{2}$ in. Ivory, Horn or Stag handle, \$0.70.

Fig. 1734 is a heavy Jack-knife; length, $3\frac{1}{2}$ in. Ivory, Horn or Stag handle, \$0.85.

Fig. 1736 is a Swedish knife. This is quite a favorite among mechanics generally, as the blade is permanently held in the handle, and can be removed, folded into its frame and replaced in the handle, making it safe for use and carriage. No. 0, \$1.50; length, $4\frac{1}{2}$ inches; length of

blade, $4\frac{1}{2}$ inches. No. 1, \$1.15; length, $3\frac{1}{2}$ inches; length of blade, $3\frac{1}{2}$ inches. No. 2, \$1.00; length, $3\frac{1}{2}$ inches; length of blade, $2\frac{1}{2}$ inches. No. 3, \$0.85; length, $2\frac{1}{2}$ in. length of blade, $2\frac{1}{2}$ inches.

A FEW WORDS ABOUT RAZORS.

There is so much silly twaddle printed and said by makers of—and dealers in—Razors, and by barbers (who ought to know the most, and really, as a rule, know the least) about Razors and shaving, that we are impelled to present a few points gathered in an experience of a quarter of a century in their sale and use.

To the youth just entering manhood, shaving may be a pleasure. Before many years, however, it is more or less of a burden, and in many cases it becomes a dreaded duty.

Occasionally we hear a man bragging about the quality of a Razor, which he or some one else has bought at an auction sale for perhaps forty or fifty cents. There is really nothing surprising about this, as there is no difference in quality of steel between a 50-cent and a \$1.00 razor. However, we wouldn't care to take chances of getting a good razor in this way.

For average beards and faces, and by average, we mean at least sixty out of every hundred, the Razors made by Wade & Butcher, Jos. Rodgers & Sons, Geo. Wootenholm, and others of the better class of makers, are well suited. These Razors can be obtained from almost any dealer in hardware and cutlery, at prices ranging from \$0.75 to \$1.00.

We will mail to any address, a Razor of this class upon receipt of \$0.75 and 10 cents extra to cover cost of postage.



FIG. 1738. FULL CONCAVE RAZOR.

This style of Razor is sold to barbers and the better class of users. As regards quality of steel and temper, they are no better than any of the high grade plain Razors, but a Full Concave Razor is more desirable for the reason that they are much easier to sharpen and keep in order. The Full Concave Razors we sell are, we believe, as good as can be produced. They are finely ground, nicely finished, and superior in all respects. We have them in four widths, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch. Price, each, \$1.50; by mail, 10 cents extra.

[30]

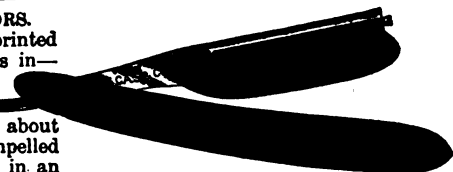


FIG. 1739. LE COULTRE (SWISS) RAZOR.

The writer has in past years, used upwards of thirty different razors, including all the best known English, German, French, and Swedish makes, and never knew what real comfort in shaving was until he began using the LeCoultre Razor.

Our attention was first directed to these Razors by a customer who had just returned from abroad, and who had bought a pair of them in Paris. He was so enthusiastic about them, that we ordered a few as samples and since then we have sold a good many—as Sterling Elliott says,—“Good many is ambiguous, but it saves lying.”

As a single instance of the popularity of these razors when once used, about three years ago we sold one of these razors to Mr. A. H. Munger, of the wholesale drygoods firm of Burnham, Hanna, Munger & Co., of Kansas City, Mo. In a few weeks Mr. Munger ordered four more, and up to the present time this first order has resulted in the sale of over three hundred of these razors.

The LeCoultre Razor is in shape quite similar to the ordinary razor, is nicely finished, but not especially handsome in appearance. The blades are removable, and are made of the finest steel, Exquisitely tempered.

We can furnish them with any number of blades, but the bulk of our sales consists of the razors with two blades, these being equal to two separate razors, as it takes but an instant to change.

Price of LeCoultre Razor, \$2.00; with 2 blades, \$3.00. Add for each extra blade, \$1.00. Postage, if sent by mail, 10 cents extra.

STAR SAFETY RAZOR.

There are a number of different styles and makes of Safety razors, but in our judgment, the “Star” is the best. There have been vast numbers of these sold, running perhaps up into the hundred thousands. We have sold many of them, and

have customers who prefer them to any other. We are inclined to believe that, while they prove entirely satisfactory in the majority of cases, there will be found a large number who cannot use them.

We sell these razors at \$1.50 each, post-paid. Can furnish them in different styles of sets, containing 2, 3, 4, 5, and 7 blades, and will send circular on application.

RAZOR STROPS.

We carry in stock four styles of Stropps, each one being the very best of its class. The genuine Emerson, flat on one side and half-oval on the other, price \$0.75. The Repenhagen, swing strop, composed of leather and canvas, price \$1.50. The Goldschmitt, of Russia leather; this strop has two sides, and is tightened or loosened by a tension rod; price \$2.00. The Saunders' four-side strop; this is our favorite, and the one we sell most of; price \$1.25.

Any of the above can be sent by mail for 12 cents postage.

FIG. 1740. 'SHAVING SOAP.

For a good, every-day Shaving Soap, we know of nothing better than Williams' "Yankee." This may be bought almost



anywhere for 10 or 15 cents a cake.

For luxury and comfort as well,

FIG. 1740. the Pinaud (Paris) Shaving Cream is simply elegant. This Shaving Cream comes in china pots, holding enough to last an ordinary shaver from twelve to eighteen months. Price, \$0.75, post-paid.

RAZOR HONES.

We carry the best quality Belgian Razor Honers, from 6 to 8 inches in length. Price, \$1.00 to \$2.00, according to size.

THERE ARE lots of GOOD THINGS in the market that are not shown in this book. Some of them we can tell you about, if you will write us.



FIG. 1740a.

GENTLEMAN'S OR YOUTH'S TOOL CHEST.

We put up a large variety of Tool Chests and Cabinets for house use, ranging in price from \$6.00 upwards, and containing tools of the best quality.

We have in preparation a new catalogue describing the various styles and sizes, and would be pleased to send this upon application.

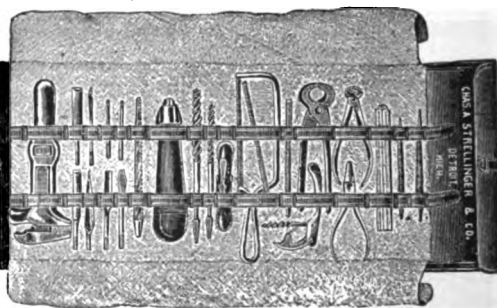


FIG. 1740b. ROLL OF TOOLS.

The Tool Roll will be found convenient for use about the office or house, also to carry about in vehicles, to use in case of break-down or other emergencies. They make a splendid present for a gentleman; are light, weighing about 4 lbs., and the tools are of most excellent quality.

No. 41 and 42 are of heavy canvas;

Just the thing for Hunter and Fishermen.

Nos. 43 and 44 are of leather, both being flannel-lined. The illustration, Fig. 1740 b shows No. 43.

No.	41	42	43	44
Price.	\$7.75	\$5.75	\$9.00	\$7.00
No. Tools.	26	21	26	21
Postage.	\$0.64	\$0.52	\$0.64	\$0.52

The Chests are strong, well made, and fitted, and are provided with secure heavy brass locks.

No. Chest.	No. of Tools.	Price, Complete.	Price, Tools Only.
31	89	\$43.00	\$30.00
32	94	53.50	40.50
33	116	66.25	53.25
34	131	80.50	67.50
35	159	103.25	88.25
36	201	120.75	105.75
37	228	139.50	124.50

Complete lists of Tools contained in these Chests will be furnished upon application.

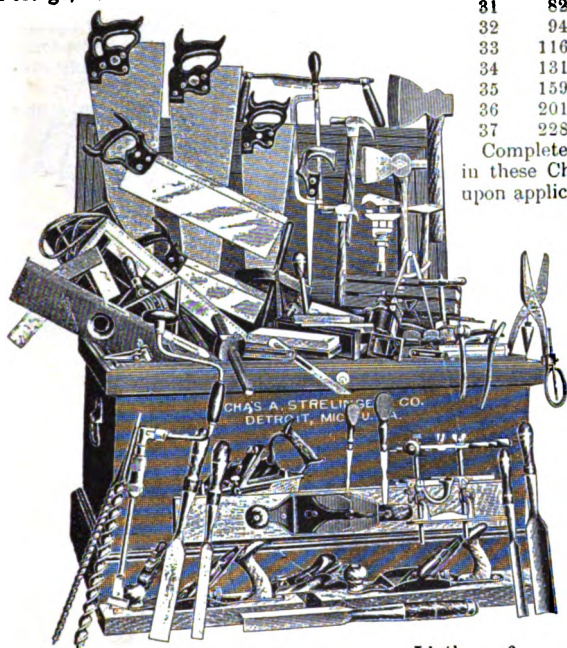


FIG. 1741. CARPENTER'S TOOL CHEST.

These Tool Chests are put up to meet a growing demand from Carpenters, Cabinet and Pattern-makers, Railroads and Mines, Farmers, Planters, Manufacturing establishments, etc., for sets of tools that are more or less complete and adapted to the different needs.

All tools are of the best quality, fully warranted, and are sharpened and fitted ready for use. If we may, with becoming modesty, say it, we believe that we are the most extensive dealers in strictly high-grade tools of any house in the world, and the tools in these Chests are our regular stock goods. We deem it necessary to state this, in connection with Tool Chests, as the majority of tool chest outfits are provided with tools of such

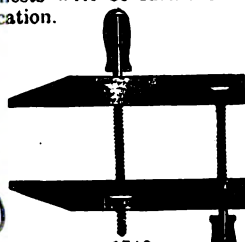


FIG. 1742.

RENO HAND SCREW.

These Hand Screws were inadvertently left out of page 168, where they belong. They are very strong and durable, and preferred by many manufacturers. They have steel screws and metal bearings.

L'gth,	6	8	10	12 in.
Open,	5½	6½	7½	8½
Each,	\$0.35	\$0.35	\$0.35	\$0.40
Doz.	3.70	3.70	3.70	4.30
L'gth,	14	16	18	20 in.
Open,	9½	10½	11½	13
Each,	\$0.50	\$0.60	\$0.75	\$0.90
Doz.	5.00	6.00	8.00	9.30



FIG. 1743.

WOOD SCREW CUTTING BOX.

Size, in.	½	¾	1	1½	2
Each,	\$0.75	.75	.80	1.00	1.15
Size, in.	1	1½	2	2½	3
Each,	\$1.45	1.65	1.85	2.60	3.40
Postage:	½ in., 10;	¾ in., 15;	1 in., 20 cts.		

WOOD-WORKERS' TOOLS.

In the line of Wood-workers' Tools, our stock is as varied and complete as the lines shown and described throughout this book. We carry in stock Tools and Supplies for

CARPENTERS AND JOINERS,
PATTERN-MAKERS,
CABINET-MAKERS,
MILLWRIGHTS,
SHIP CARPENTERS,
CARVERS, ETC., ETC.

We sell nothing but the highest grade tools, and will be pleased to hear from those mechanics who are unable to supply their wants at home.

We print a very complete catalogue of Wood Workers' Tools, containing between 600 and 700 illustrations. This catalogue will be sent to any address upon receipt of 8 cents in stamps.

In an order just received from G. M. Slaughter, Wharton, Texas, he says, "I think the Wood Workers' catalogue is especially fine. Some of the 'boys' think you are high on your tools, but I have discovered that they like mighty well to lay theirs down and use mine whenever the opportunity offers."

In writing, ask for Catalogue No. 17.



FIG. 1744. CIRCULAR PLANE.

In Planes we have the latest and best styles of Combination and others, as well as the Beech, Applewood, Rosewood, and Boxwood Bench Planes; also Moulding Planes in great variety.



FIG. 1745. CHAMFER SPOKE SHAVE.

We have both the Iron and Wood Spoke Shaves and Draw Knives, of all sizes and kinds.



FIG. 1746. CARVING TOOL.

We carry in stock upwards of one thousand sizes and styles of Chisels and Gouges, including both Plain and Beveled Edge Chisels, and Chisels and Gouges for Pattern-makers, Millrights, and Carvers. We have upwards of five hundred sizes in the various shapes of the celebrated Addis' Carving Tools.



FIG. 1747. PANEL SAW.

We sell the Henry Disston & Sons Hand Saws, and have them in all shapes, styles and sizes.



FIG. 1748. EXTENSION BIT.

In Augers and Bits we have all of the best kinds, including Russell Jennings' Auger, Car, Dowel and Millwright bits, the Forstner bit, etc. Our stock as regards both variety and quality, is not excelled.

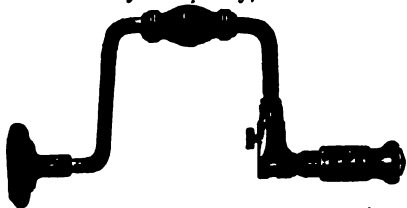


FIG. 1749. BIT BRACE.

In fact our line comprises almost everything that can be desired.

Carvers' Punches, Tool Holders, Joiners and Brad Hammers, Hatchets, Hand Axes, Adzes, Saw Sets, Saw Filers, Saw Vises, Extension Braces, Boring Tools, Countersink Bits, Hollow Augers, Dowel Plates, Auger Handles, Marking and Mortise Gauges, Carvers' Clamps, Reamers, Bench Stops, Chamfer Attachments, Beading and Moulding Tools, Door Gauges, Floor Clamps, etc., etc.

In writing for Wood-workers' catalogue send 8 cents in stamps and ask for Catalogue No. 17.

WOOD TURNERS' TOOLS.

All our Wood Turning Tools are of the highest quality, and are made from solid steel. The average length of Turning Chisels and Gouges is about 12 inches.

The "Hustler" line of Turning Tools, shown in Figs. 1753 to 1757, was designed as the result of nearly thirty years experience in the largest furniture shops. They have been on the market for about five years, and when once introduced they are preferred above all others.



FIG. 1750. TURNING CHISEL.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$0.23	.25	.27	.29	.32	.35
Size,	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	
Each,	\$0.39	.47	.59	.70	.81	



FIG. 1751. TURNING GOUGE.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$0.28	.31	.34	.36	.41	.45
Size,	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	
Each,	\$0.51	.63	.81	.95	1.15	



FIG. 1752. PARTING TOOL.

This tool is from 8 to 9 inches in length. Each, $\frac{1}{4}$ size, \$0.40; $\frac{1}{2}$, \$0.45; $\frac{3}{4}$, \$0.50.

"HUSTLER" TURNING TOOLS.

The "Hustler" Chisel is used for cutting in on the square or round, and heading work. By its peculiar shape, it will accomplish from 25 to 50 per cent more work than any other tool. The Hustler is beveled from top to bottom, and is grooved on top the full length of the blade, with a flange on each side, leaving a lip projecting slightly beyond the edge of the tool; the lips cutting across the grain, while the edge of tool cuts with the grain by the same motion of the hands.



FIG. 1753. "HUSTLER" CHISEL.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$0.50	.55	.60	.65	.80	
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1		
Each,	\$0.95	1.10	1.25	1.50		

FIG. 1754. "HUSTLER" BEADER.

These tools are adapted for Face Plate work. Like the Hustler, they are tapered from top to bottom to give clearance.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$0.35	.35	.35	.40	.45	.50
Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	1
Each,	\$0.55	.65	.75	.85	1.00	



FIG. 1755. V SHAPE TENONER.

We recommend our V Shape Tenoner to all Wood Turners.

Size,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each,	\$1.40	1.65	1.90	2.25		

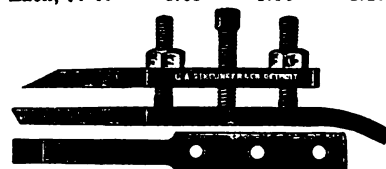


FIG. 1756. SCREW TENONER. \$2.75.

The Screw Tenoner will cut uniform tenons in both hard and soft wood, and is easily adjusted to any size up to $1\frac{1}{2}$ inches. The cutting blade is from $2\frac{1}{4}$ to $2\frac{1}{2}$ inches long from shoulder, and $\frac{1}{4}$ and $\frac{1}{8}$ inch wide, the bottom prong being a little narrower than top blade, to give clearance.

COMBINATION HUSTLER & SIZER, FIG. 1757.

A heavy, strong tool, which can be used with ordinary chisel in place of Hustler.

Half-inch Hustler is supplied with it; smaller sizes can be used.

Price, complete, \$2.50.

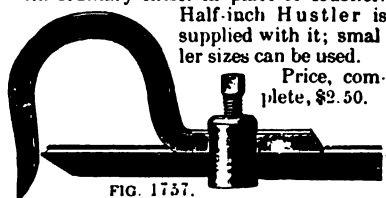


FIG. 1757.



FIG. 1758. TURNERS' SIZER.

Small, opening to $1\frac{1}{2}$ inches, each, \$1.15
Large, " " 5 " " 1.60

WOOD WORKING MACHINERY.

In these few pages we show a line of Wood-Working Machinery, including machines worked by hand and foot, and by power. We make no attempt to show a great variety of large or special machinery, but only such machines and tools as are required by Carpenters, Pattern and Cabinet-makers, Builders, and the general run of small and medium sized shops.

By far the greater portion of this class of machinery is sold through correspondence. There are perhaps upwards of two hundred concerns in this country who make a specialty of Wood-Working Machinery, and, while a large portion of this product is of high grade, a much larger portion is indifferent as to quality. Within the past few years, there have been marked improvements as regards construction, workmanship, and quality of materials used in the manufacture of Wood-Working Machinery.

We have had considerable experience in the handling of this class of goods, and the line we present here is well selected, the machines being, for the most part, such as we have used and sold and know all about.

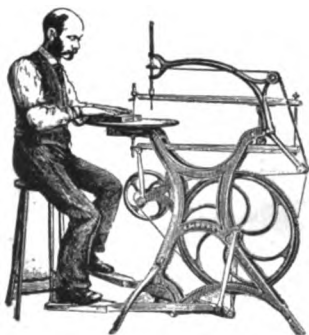


FIG. 1759. EMPIRE SCROLL SAW.

This machine cuts up to 3 in. thick, swings 24 in., has Upright Drill, Tilting Table, powerful Treadle motion, cuts rapidly and is easy to operate. Shipping weight 340 lbs. The Victor Lathe can be used on this machine (see Fig. 1761).

No. 1 (as shown in cut), with one doz. Blades, Twist Drill and Wrench, \$22.50.

No. 2, same as No. 1, but without Drill Attachment, \$18.00.

Tight and Loose Pulleys for Power, \$4.50; sent in place of Treadles when desired, without extra charge.



FIG. 1760. VICTOR SCROLL SAW.

This machine is designed for Pattern, Model and Cabinet-makers, Carpenters, and all wood-workers who desire a machine of large capacity suitable for close and accurate work. It has Upper and Lower Spindle, Adjustable Tension Spring, Dust-blower, Drill, Tilting-table, etc.; cuts up to 3 in. thick, and swings 24 in. Shipping weight 330 lbs. The Victor Lathe can be used on this machine (see Fig. 1761).

No. 1 (as shown in cut), with one doz. Blades, Twist Drill and Wrench, \$36.00.

No. 2, same as No. 1, but without Drilling Attachment, \$31.50.

No. 4, for power only, arranged to fasten to a bench; has Tight and Loose Pulleys for 1½ inch belt. No Drilling Attachment. Price, \$22.50.

Tight and Loose Pulleys for power for Nos. 1 or 2 machines, \$4.50.

Tight and Loose Pulleys in place of the Treadle when desired, at same price.



FIG. 1761. VICTOR LATHE ATTACHMENT.

This Lathe is practical, strong and well finished, can be attached to either the "Victor" or "Empire" machines, swings 6 in., and takes 18 in. between centers. Each lathe is provided with Short and Long Rests, Point, Cup and Spur Centers, and Emery Wheel. Price, \$9.00.

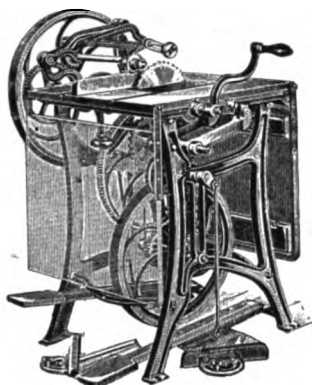


FIG. 1762. "UNION" COMBINATION SAW.

This is a new Combination Circular Sawing Machine, with Self-Feed Ripping Device, etc.; designed for Carpenters, Cabinet, Pattern, Picture-frame and Box-makers, and wood-workers generally. Is strong, substantial, and thoroughly well built, and is suitable for ripping, cross-cutting, mitering, rabbeting, grooving, gaining, dadoing, edging up, jointing stuff, boring, etc. Has iron table, cut gears, has four changes of speed, three changes of feed, extension-table, etc.

PRICES.

No. 1, complete, (as shown in Fig. 1762), with one each, 7 and 10 inch rip, and one 7 inch cross-cut saw, \$63.50. Shipping weight, 550 lbs.

No. 2, same as No. 1, but without Self-Feed Ripping Device and Drop Leaves, and with two 7 inch saws, \$45.00. Shipping weight, 410 lbs.

NOTE.—The Self-Feed Ripping Device cannot be fitted on this machine after leaving factory.

No. 3, for hand or steam power, without Chain Belt Attachment and Foot Power; this is arranged as a Self-Feed rip saw; can also be used for grooving, \$45.00. Shipping weight, 425 lbs.

NOTE.—The Chain Belt Attachment and Foot Power cannot be fitted to this machine after leaving factory.

No. 4, for power only, without Ripping Device, Drop Leaves, Foot and Hand Power, but with Tight and Loose Pulleys, and one each 7 inch rip and cross-cut saw, \$36.00. Shipping weight, 300 lbs.

Tight and Loose Pulleys for power, for either Nos. 1, 2 or 3 machines, \$4.50.

UNION BORING ATTACHMENT.

(Not illustrated.)

This is a thoroughly practical and substantial Attachment for the Union machines; can be easily and quickly placed in position on Nos. 1, 2 or 4 machines, and operated by foot, hand or steam power. Price, complete, \$9.00.

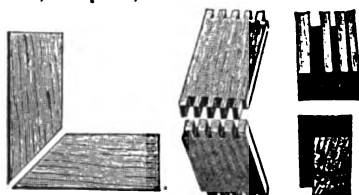


FIG. 1763.

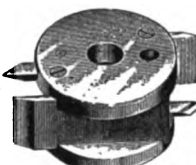


FIG. 1764.

This improved Cutter Head, Fig. 1764, is adjustable, and holds knives from $\frac{1}{4}$ to 2 in. wide; is designed to use on the saw arbor of the Union machine for cutting grooves, gains, dados, rabbets, edge-up, joint stuff, etc. For many kinds of work this is superior to the Grooving Saw. Special knives can be used for cutting beaded, fluted or irregular surfaces. This Cutter Head can be used on Nos. 1, 2 or 4 machines, and on No. 3 if run by power.

PRICES.

Union Cutter Head, with one pair Straight Knives, \$3.15.

Extra Straight Knives, any width from $\frac{1}{4}$ to $1\frac{1}{2}$ in., per pair, \$1.35.

For Grooving Saws, see page 481.



Fig. 1765 is an improved style of Grooving Saw, having special shaped teeth and will cut much easier and better than the old style, and is not as liable to clog. On certain kinds of work they may be better adapted than the Union Cutter Head, but we recommend the latter for use on a majority of work.

Dia.	Thick.	Size.	Price.	Dia.	Thick.	Size.	Price.
5 in.	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	\$2.00	5 in.	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	\$4.00
5 "	$\frac{1}{4}$ "	$\frac{3}{4}$ "	2.50	5 "	$\frac{1}{4}$ "	$\frac{3}{4}$ "	4.50
5 "	$\frac{1}{4}$ "	1 "	3.00	5 "	$\frac{1}{4}$ "	1 "	5.00
5 "	$\frac{1}{4}$ "	1 $\frac{1}{2}$ "	3.50				

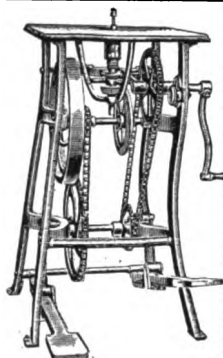


FIG. 1766.

but can be adjusted so as to cut beads, flutes, or other styles of moulding in the center of a 4 inch panel.

PRICES.

No. 1, complete, as shown in cut (moulding cutters extra), \$37.00. Shipping weight 250 lbs.

No. 4, for power only, with Pulley on intermediate shaft and including Countershaft, \$37.00.

Pulley to fit on intermediate shaft for steam power, \$2.00.

Countershaft arranged for open and cross belts, for reversing motion, \$9.00.

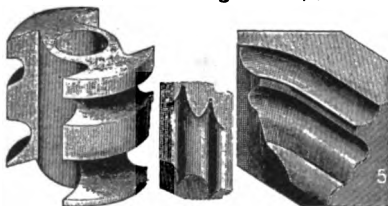


FIG. 1767

SAMPLES OF CUTTER AND MOULDINGS.

We can furnish over forty styles of moulding cutters, suitable to use in connection with the Rex Moulder, and many of these cutters are capable of producing different effects by changing their position on the work. They are reversible, are made from solid steel, and are every way superior to the cheap cutters made from sheet metal; the Spindle may be run either way to suit the grain of the work. Will send sheet showing different styles of work produced. Price of Cutters, each (except No. 95), \$1.50.

REX MOULDER.

Fig. 1766 is a new Moulding or Shaping machine, designed for Carpenters, Cabinet-makers, and all wood-workers who desire to finish straight, circular, curved or irregular work with moulded edges. It is designed especially for edge mouldings, using cutters up to 1 inch face,

DIAMOND MORTISER.

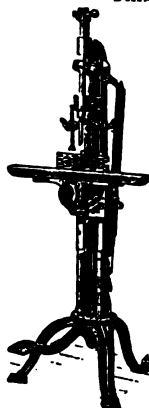


FIG. 1768.

Chisels $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 in., each, \$1.00.

DIAMOND TENONING TOOL.

This is a new and improved Tenoning Tool, which will be found a valuable attachment to the Diamond Mortising Machine. The knives are constructed with side lips, and have a draw or shear cut on both front and side edges, which leaves the shoulders and sides of tenon smooth and true. We can furnish this tool with shank fitted to any make of mortising machine, provided we are furnished with a templet giving exact size of shank.

Price of No. 2 Diamond Tenoning Tool, \$4.50.

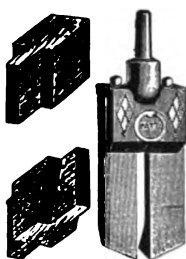


FIG. 1769.

sides of tenon smooth and true. We can furnish this tool with shank fitted to any make of mortising machine, provided we are furnished with a templet giving exact size of shank.

Price of No. 2 Diamond Tenoning Tool, \$4.50.

OUR FOOT POWER MACHINES ARE WELL MADE AND SUPERIOR IN ALL RESPECTS. IN COMPARING OUR PRICES WITH OTHER MAKES, PLEASE COMPARE CAPACITIES AND WEIGHTS OF MACHINES. MANY OF THE MACHINES ON THE MARKET ARE VERY LIGHT AND SO FLIMSILY MADE, THAT THEY RATTLE THEMSELVES TO PIECES WITHIN A YEAR OR TWO.

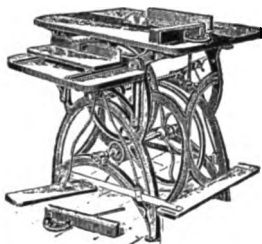


FIG. 1770.

MARSTON HAND AND FOOT POWER
CIRCULAR SAW.

We believe this to be the best tool of its class ever placed on the market. Have sold these machines for upwards of twenty years, and we have never known them to fail in giving perfect satisfaction. The grooves for gauges are planed in an iron top which is 10 inches wide. The gauge tongues are of steel and are accurately fitted. With each machine is included two 7 inch Saws—one each Cross cut and Rip—set and filed; two Cutting off Gauges, one Rip Gauge, two Crank Handles and Wrench.

No. 1 Machine, complete, \$54.00; with Boring Attachment and Side Treadle, as shown in cut, \$60.00. Shipping weight, 420 lbs.

No. 2 Machine is identical with the No. 1, excepting that it has a heavier balance wheel, giving more power, and is capable of doing more and heavier work. Is sold at an additional price of \$4.25.



FIG. 1771

POWER CIRCULAR SAW

For Boring Table, add \$4.50. For Countershaft, if wanted, add \$13.50.

Top 28x38 in., 32 in. high, and has iron center part for gauges to slide in.

This cut represents a strong, substantial machine; has arbor 1 inch diam., pulley 2½ in. diam., suitable for saws up to and including 12 inches in diam.

Price, Saw only, \$36.00.

20 INCH FOOT POWER BAND SAW.

This cut represents an improved Band Saw, which is adapted to all kinds of work. It is a well-made tool; gears are cut from the solid; pulleys 20 inch diam.; machine will cut to center of a 40 inch circle.

Shipping weight, about 400 lbs.

Price, \$53.50, for machine, complete, with one each, ⅞ and ⅝ Saw Blades, Crank Handle and Wrench.

We have a smaller machine of the same general type, that cuts to center of a 30 inch circle. Price, \$45.00.

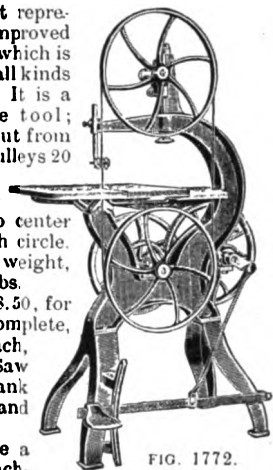


FIG. 1772.

24 INCH BAND SAW.

Figure 1773 represents our 24 Inch Band Saw with Countershaft attached.

It is of the same general design as the 20 Inch Machine shown in Fig. 1772, only being larger and heavier. It is a good, well-made, accurate machine, suitable for such band sawing as is found in carpenter, pattern, cabinet and small job shops.

Table is 24 x 24 in.; shipping weight about 400 lbs. Price, \$58.50, with one each, ⅞ and ⅝ inch Saw Blades.

We also have a small machine of the same general type that cuts to center of 30 inch circle. Price, \$40.50.

For EXTRA BAND SAW BLADES see page 479.

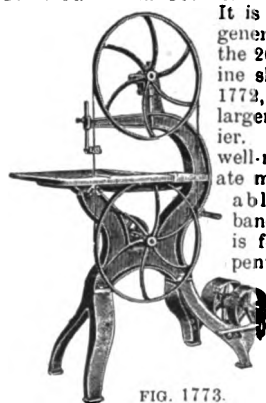


FIG. 1773.

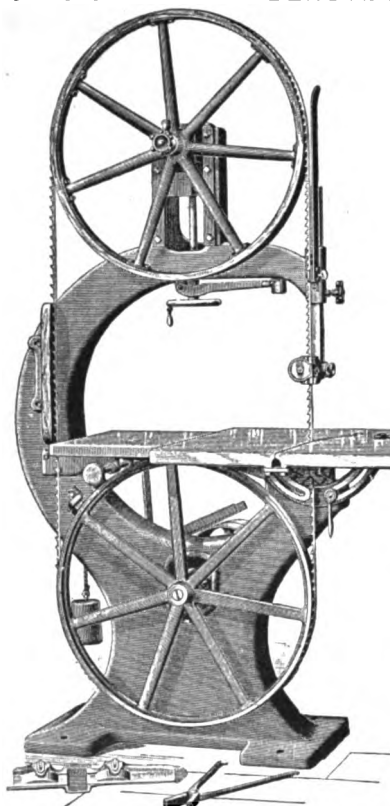


FIG. 1774.

34 INCH BAND SAWING MACHINE.

This machine is well adapted for all medium work on hard or soft wood. Blades up to 1 inch wide may be used. We recommend them for Carpenter, Pattern-maker, Sash and Door, Wagon, and Job shops, Planing mills, etc

Price, complete, \$106.00. If Iron Table is wanted, add \$6.00. About one horse power is required to run this machine

We can furnish other styles and sizes of Band Saws when desired.

TEARING CATALOGUE.—Each article in this book is designed by either a figure number, stock number or both. Please do not cut or deface this book. Order goods by figure or stock number

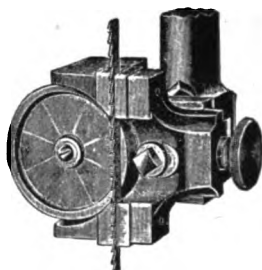


FIG. 1775

WRIGHT'S IMPROVED NON-FRICTION BAND SAW GUIDE.

It is a known fact that where saws run against stationary Guide Plates, the heat generated by the friction causes saws to expand and crystalize. This is beyond doubt the great cause of saws checking and breaking.

The Wright Band Saw Guide has been in the market over four years. There are nearly ten thousand of them in use, and they are considered the standard.

No. 1 Guide, \$8.50, suitable for saws $\frac{1}{4}$ wide and upwards.

The Wright Co. also make a special Guide for Band, Mill and Re-Saws. We will send circular of this upon application

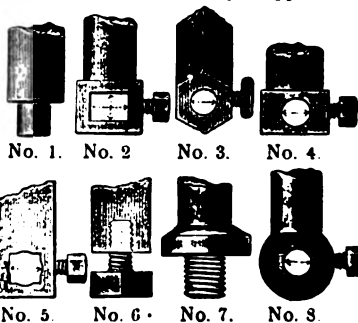


FIG. 1776. POSTS.

In ordering, give number of Post as near as can be judged from above sketches. Give maker's name of machine, and distance from Post to back of saw. If the Post differs from the above, send sketch giving measurements; also state width of saws. For under Guides, give distance from back of saw to casting, and send rough sketch of how old Guide is applied.

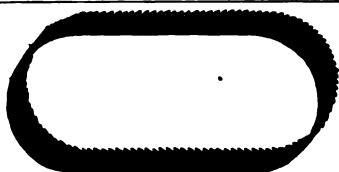


FIG. 1777. BAND SAW BLADE.

Our Band Saw Blades are, we believe, as good as any in the market. We will guarantee them free from cracks or flaws. All saws are brazed to length without extra charge. For Filing and Setting ready for use, we charge 40 cents extra for all sizes to $\frac{1}{2}$ inch, and 60 cents for $\frac{1}{2}$ to $1\frac{1}{2}$ inch.

PRICES.

$\frac{1}{8}$, $\frac{1}{4}$ or $\frac{1}{2}$ inch wide, 20, 21, 22, 24 or 25 gauge, per ft. 6 cts.
 $\frac{1}{4}$ or $\frac{1}{2}$ inch wide, same gauge as above, per ft. 7 cts.
 $\frac{1}{2}$, 20, 21 or 22 gauge, per ft. 8 cts.
 $\frac{1}{2}$, 20, 21 or 22 " " " 10 "
 $\frac{1}{2}$ inch and wider, 19 and 20 gauge, as follows: $\frac{1}{2}$, 12 cts.; $\frac{3}{4}$, 13 $\frac{1}{2}$; 1, 15 cts.; $1\frac{1}{2}$, 18 cts.; $1\frac{3}{4}$, 22 cts.; $1\frac{1}{2}$, 27 cts.; 2, 32 cts.

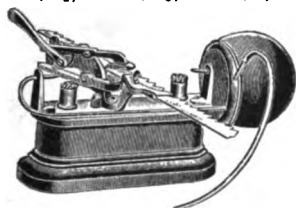


FIG. 1778. BUFFALO BRAZING LAMP.

For brazing band saws up to $1\frac{1}{2}$ inch wide. Price, \$10.00.

FIG. 1779.

AMBLER
BRAZING
LAMP.

Price, \$7.00



FIG. 1780

Price,
\$10.00.

"LITTLE GIANT" SAW SETTING MACHINE.
Brazing Clamps for small band saws,
\$1.35.

Brazing Tongs for band saws, \$1.00.

Silver Solder for band saws, page 439.

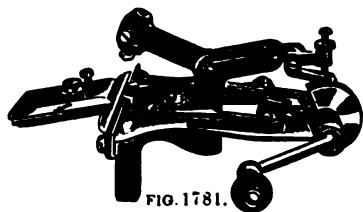


FIG. 1781.

AUTOMATIC BAND SAW SET. Price, \$7.00

This is one of the simplest and best tools in the market. By simply turning the crank, it will set from 75 to 150 teeth per minute; will set every tooth alike. We have sold large numbers of these Saw Sets, and can recommend them to give satisfaction in every particular

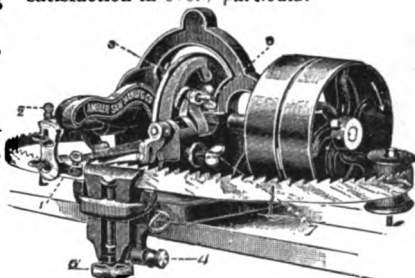


FIG. 1782. BAND SAW FILER.

The above cut illustrates a machine for filing Band Saws, which is simple, practical, durable, and reasonable in price. The use of this machine will save two-thirds of the ordinary expense, as compared with hand filing.

Price, complete, \$35.00; Countershaft, if desired, \$5.00

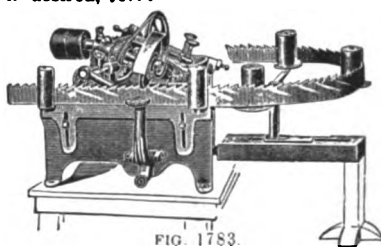


FIG. 1783.

ROGERS' (EMERY WHEEL) BAND SAW FILER.

For Band Re-Saws from 2 to 6 in. wide, simple in design, easily operated; price, with 3 emery wheels, \$75.00. Guaranteed to give satisfaction.

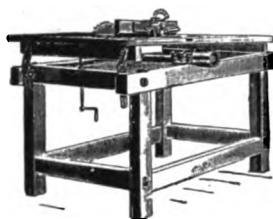


FIG. 1784.
IMPROVED
SLITTING
SAW TABLE.

The frame work of these machines is made of black birch and rock maple, thoroughly seasoned and kiln-dried. The tops are glued-up of narrow strips, and so cleated that they cannot warp or split. The saw arbors are self-oiling, and are made of steel. They are furnished with pulley between the bearings, or outside as may be preferred, also with Patent Combination Saw Gauge. These tables are made in six sizes, as follows:

No.	Price.	Size of Hole Table. in Saw.	Size Saw to use.	Width of Belt.
0	\$32.00	26x42	$\frac{1}{2}$ 6 to 8 in.	3 in.
1	39.50	31x46	$\frac{3}{4}$ 8 " 12 "	4 "
2	47.50	34x54	1 10 " 16 "	4 $\frac{1}{2}$
3	51.50	36x58	1 $\frac{1}{2}$ 16 " 20 "	5
4	55.00	38x64	1 $\frac{3}{4}$ 20 " 24 "	6
5	59.00	41x70	1 $\frac{7}{8}$ 24 " 30 "	7

FIG. 1785.
COMBINATION
SAW
GAUGE.



This cut shows the style of Saw Gauge used with the Improved Slitting Saw Tables, Fig. 1784. Can be readily attached to any common saw table, and as a labor-saving device it is a complete success.

No. 1, \$5.75, with Bed Plate either 14, 16 or 18 inches long.

No. 2, \$6.25, with Bed Plate either 22, 24, 26 or 28 inches long

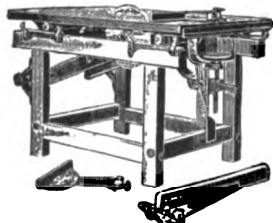


FIG. 1786.
IMPROVED
COMBINATION
SLITTING
AND
CUT-OFF
SAW TABLE.

In above cut the machine is arranged for cross-cutting. The bed is mounted on

patent roller bearings in such a manner that the whole table is made to move back and forth, carrying the work absolutely square with the saw. The table runs so easily, it requires less than one pound pressure to move it under any load, from one to 300 lbs. The frame work is made of black birch and rock maple, thoroughly seasoned and kiln-dried; the bed is glued-up of narrow strips and securely fastened to heavy iron cleats, so it cannot warp or split. A throat 5 inches wide is placed in each table; this is quickly removed for dado cutting and all similar work. It is a practical common sense tool, and can be operated with less labor than any other saw on the market.

No. 1, \$67.50; has bed 33x46 inches; is suitable for saws from 8 to 12 in. diam.

No. 2, \$90.00; has bed 38x58 inches; is suitable for saws from 14 to 20 in. diam.

The price includes Countershaft complete, and one each, Slitting, Cross-cut, and Miter Gauges.

FIG. 1787.
SWING SAW.



This machine may be used for many purposes, but is designed especially to cut up rough stock. It is strong, durable, and the saws can be handled with ease. Is made with stationary or revolving countershaft, which can be raised or lowered 4 inches; will carry saws up to 18 inches in diam. Price, \$45.00.

FIG. 1788. CIRCULAR SAWS.



We price here a line of Circular Saws. Our stock at the present time consists of Henry Disston & Son's make, the quality of which is so well known as to need no comment here.

We can furnish to order Chisel Tooth, Shingle, Veneer, Miter, Concave, Grooving and special Saws of almost any kind.

Following prices apply to the regular line of Patent Ground and Tempered Solid Tooth Circular Saws:

Diameter.	Each.	English Gauge.	Size of Hole.
3 in.	\$0.50	21	$\frac{1}{4}$ in.
4 "	.70	19	$\frac{3}{8}$ "
5 "	.85	19	$\frac{1}{2}$ "
6 "	1.00	18	$\frac{3}{4}$ "
7 "	1.15	18	$\frac{1}{2}$ "
8 "	1.35	18	$\frac{1}{2}$ "
9 "	1.65	17	$\frac{1}{2}$ "
10 "	1.80	16	1 "
11 "	2.10	16	1 "
12 "	2.25	15	$1\frac{1}{4}$ "
14 "	2.70	15	$1\frac{1}{4}$ "
16 "	3.30	14	$1\frac{1}{4}$ "
18 "	4.20	13	$1\frac{1}{4}$ "
20 "	5.10	13	$1\frac{1}{4}$ "
24 "	7.20	11	$1\frac{1}{4}$ "
26 "	8.40	11	$1\frac{1}{4}$ "
30 "	10.80	10	$1\frac{1}{4}$ "
32 "	12.00	10	$1\frac{1}{4}$ "
36 "	15.30	9	$1\frac{1}{4}$ "

Prices on other sizes furnished upon application.



FIG. 1789—STYLE A. FIG. 1790—STYLE B
CIRCULAR SAW MANDRELS.

No.	Style A.	Style B.	Hole in Saw	Diam. Flang	Style A.	Style B.
1	\$6.30	\$6.90	1	2 $\frac{1}{2}$	14	16 $\frac{1}{2}$
2	7.20	7.65	1 $\frac{1}{2}$	3	16	19
3	7.65	8.10	1 $\frac{1}{2}$	3 $\frac{1}{2}$	13	21 $\frac{1}{2}$
4	8.80	9.70	1 $\frac{3}{4}$	4	20	24
5	9.90	10.80	1 $\frac{3}{4}$	4 $\frac{1}{2}$	22	26
6	11.25	12.40	1 $\frac{3}{4}$	5	24	28
7	12.40	13.50	1 $\frac{3}{4}$	5 $\frac{1}{2}$	26	30 $\frac{1}{2}$
8	14.00	17.55	1 $\frac{3}{4}$	6	28	32
9	19.35	21.15	1 $\frac{3}{4}$	6	32	37

NO NAME FOLKS.—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name. If it is an order from him with money enclosed, we are pretty sure to hear from him, wanting to know where the goods are—and sometimes the letters are not overly civil; if it is a letter of inquiry and our correspondent gets no answer, he thinks we are inattentive or careless, and as a result we are apt to lose what might be a good customer.

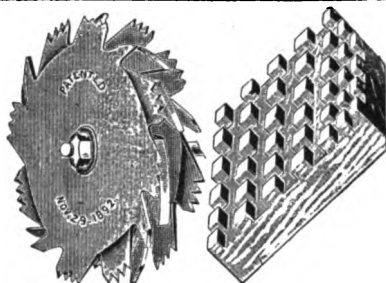


FIG. 1791. THE HUTHER PATENT GROOVER OR DADO HEAD.

These Groovers can be furnished suitable for any width groover from $\frac{1}{4}$ to 2 in. or over. They consist of 2 outside saws, each of which is a groover in itself, and as many inside cutters as required. Inside cutters are made $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ in. thick; outside cutters, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ in. They will cut a perfect groove either with or across the grain, and will not leave a rough edge as is the case with ordinary groovers. Where a wider groove than $\frac{1}{2}$ in. is needed, inside cutters will be required. They have been on the market less than two years, and there are over one thousand sets in use. Guaranteed to give satisfaction in all respects.

Set No. 1 cuts grooves $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch.

Set No. 2 cuts $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{4}$ inch.

Set No. 3 cuts from $\frac{1}{4}$ to $\frac{3}{4}$ inch inclusive, by 16ths (10 sizes).

Set No. 4 cuts from $\frac{1}{4}$ to 1 inch inclusive, by 16ths (14 sizes).

Set No. 5 cuts from $\frac{1}{4}$ to $1\frac{1}{4}$ inches inclusive, by 16ths (22 sizes).

Set No. 6 cuts from $\frac{1}{4}$ to 2 inches inclusive, by 16ths (30 sizes).

PRICE LIST OF GROOVERS.

Diam in	Set No. 1	Set No. 2	Set No. 3	Set No. 4	Set No. 5.	Set No. 6.
5	\$5.80	\$7.05	\$8.65	\$9.90	\$12.40	\$14.90
6	5.80	7.05	8.65	9.90	12.40	14.90
7	6.90	8.15	9.85	11.20	13.90	16.60
8	7.60	9.05	10.85	12.30	15.20	18.10
9	8.35	9.90	11.90	13.45	16.55	19.65
10	9.15	10.80	13.00	14.65	17.95	21.95
12	10.85	12.95	15.45	17.55	21.75	25.95

In ordering, state number of set, diameter of groove, and size of hole wanted.

Extra cutters may be had at any time.

DO NOT Cut or Tear the pages of this book, as that destroys it for future reference. Order by figure number.



FIG. 1792.

IMPROVED HAND PLANER AND JOINTER.

This machine possesses new features and advantages in construction not found in most machines of like character. The frame is of the same length as the table, is heavy, well braced, and does not vibrate when in use; Tables can be adjusted to any position that may be required; Bearings, 3 in number, are long and of ample size; Head is forged of best steel, and carries 2 cutters. The adjustable Fence can be angled to any position that may be desired.

PRICES.

12 in., \$89.00; 16 in., \$98.00; 20 in., \$108.00; 24 in., \$124.00; 30 in., \$145.00.

If wanted with four-sided Head, add 5 per cent to the above prices.

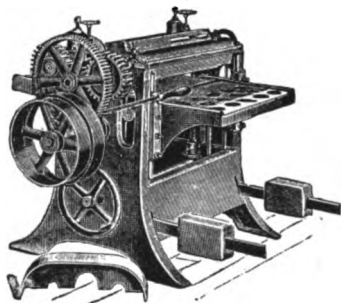


FIG. 1793.

NO. 1 SURFACE PLANER AND SMOOTHER.

This is a well made and well designed Single Surface Planer, made with especial reference to doing smooth work; is intended for fine door and panel, furniture, carriage, sleigh, chair and similar work; will plane from $\frac{1}{4}$ to 6 in. in thickness.

PRICES.

20 inch, \$165.00; 24 inch, \$185.00; 28 inch, \$200.00.

WHEN you are in need of any article, and cannot find it in this book, please write us and we will gladly assist you.

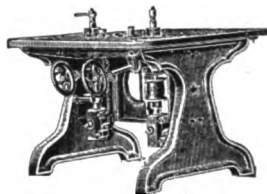


FIG. 1794.

SHAPER AND VARIETY MOULDING MACHINE.

These machines are made in four sizes:

No. 0 is a heavy tool designed for car or wagon-shops. Spindles made of 2 in. steel; 28 in. between spindles; Top is 46x55 in. One set of each, 2 and 4 inch steel collars goes with machine.

No. 1, same as No. 0, excepting it has 1 $\frac{1}{2}$ in. Spindles, 26 in. apart; top 46x53 in.; one set of 1 $\frac{1}{2}$ and 3 in. steel collars.

No. 2—Spindles 1 $\frac{1}{2}$ in. steel; 24 in. between spindles; top 44x45 in.; Collars 1 $\frac{1}{2}$ and 3.

No. 3—Spindles 1 $\frac{1}{2}$ in.; 22 in. between spindles; top 40x45 in.; Collars 1 $\frac{1}{2}$ and 2 $\frac{1}{2}$.

The wood tops on machine are made from well-seasoned hard wood, glued up from 2 inch square stuff.

No.**PRICES.**

0, Wood Top,	\$150.00;	Iron Top,	\$157.00
1 " "	140.00	" "	147.00
2 " "	125.00	" "	132.00
3 " "	115.00	" "	120.00



FIG. 1795.

ROUTING AND ROUNDING MACHINE.

This is adapted to furniture work, such as routing out work for the hand or machine carver, rounding the edges of carved work, or rounding work that is usually done on shapers. For making buttons or rosettes it has no superior.

Price, complete with 2 sets of Cutters, Double Spindle, \$112.00; Single Spindle, \$85.00.



FIG. 1796.
IMPROVED
SPINDLE
WOOD-
CARVING
MACHINE.

In the hands of a competent operator, the variety and quality of ornamentation it is capable of producing is surprising, and its capacities practically unlimited. We furnish machine complete with Counter-shaft and 14 assorted Cutters, and can furnish to order Cutters of any style or shape.

Extra heavy Carver, with brass boxes, \$55.00; Regular size Carver, with brass boxes, \$50.00; Regular size, with babbit boxes, \$38.00; Special Carver, to suspend from ceiling, \$43.00.

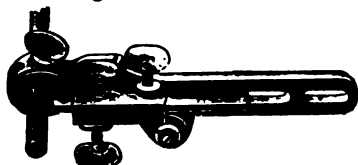


FIG. 1797. LATHE DOWEL TOOL.

This is a handy tool for making round rods of wood, for pins, dowels, or any other purpose. It can be used by holding it in the hand, or can be fastened in a Slide Rest; has interchangeable bushings, suitable for sizes $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{2}$, 2 , $2\frac{1}{2}$, and 3 inch diam. Price, complete with bushings and chucks for holding work, \$3.00. Chuck for pointing rod, \$1.00 extra.



FIG. 1798. ROD, PIN AND DOWEL MACHINE.

This is one of the best machines for the purpose now in use. Can furnish sizes from $\frac{1}{4}$ to 3 in. We send 3 sizes of heads with each machine, as in list below. Other sizes may be substituted if desired.

No. 1,	\$30.00,	$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ in.;	Speed, 3500
" 2,	37.00,	$\frac{1}{2}$, $\frac{3}{4}$ and 1 "	" 3000
" 3,	40.00,	$1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ "	" 3000
" 4,	43.00,	$1\frac{1}{2}$, $1\frac{3}{4}$ "	" 2500
" 5,	47.00,	$1\frac{3}{4}$, 2 "	" 2500
" 6,	55.00,	any 3 sizes under 3 in.	2000

MACHINE BORING BITS.



RUSSELL JENNINGS'
STYLE OF BITS.

We find that the greater part of our customers prefer the genuine Russell Jennings' bits for machine boring. We carry these in stock with 4 and 6 inch twist, the shanks being machine-turned, $\frac{1}{4}$ inch diam. by 2 inches long.

Size.	Each.	Dosen.	Size.	Each.	Dosen.
$\frac{1}{4}$	\$0.38	\$1.08	$\frac{1}{2}$	\$0.74	\$7.99
$\frac{1}{2}$	.32	4.08	$\frac{3}{4}$	.81	8.64
$\frac{3}{4}$	.34	3.60	$1\frac{1}{4}$	.81	8.64
1	.38	4.08	$1\frac{1}{2}$	.88	9.36
$1\frac{1}{4}$	.38	4.08	$1\frac{3}{4}$	.95	10.08
$1\frac{1}{2}$	.43	4.56	2	1.00	10.80
$1\frac{3}{4}$	.43	4.56	$2\frac{1}{4}$	1.08	11.52
2	.50	5.28	$2\frac{1}{2}$	1.15	12.24
$2\frac{1}{4}$	.50	5.28	$2\frac{3}{4}$	1.23	12.96
$2\frac{1}{2}$	.54	5.76	3	1.28	13.68
$2\frac{3}{4}$	.54	5.76	$3\frac{1}{4}$	1.35	14.40
3	.59	6.24	$3\frac{1}{2}$	1.42	15.12
$3\frac{1}{4}$	.59	6.24	$3\frac{3}{4}$	1.49	15.84
$3\frac{1}{2}$	.63	6.72	4	1.55	16.56
$3\frac{3}{4}$	.68	6.72	$4\frac{1}{4}$	1.69	18.00
4	.69	7.28	$4\frac{1}{2}$	1.82	19.44
$4\frac{1}{4}$	.69	7.28	$4\frac{3}{4}$	1.97	20.88
$4\frac{1}{2}$	.74	7.92	5	2.10	22.32

We also carry in stock the regular double-flipped machine bits in sizes $\frac{1}{4}$ to 1 inch by 16ths. For prices deduct 25 per cent from above list.



FIG. 1799. COUNTERSINK.



FIG. 1800. COUNTERBORE.



FIG. 1801. SCREW SHANK BITS.



FIG. 1802. BORING SHAFT. Price, \$7.50.

This is an inexpensive machine, well adapted to many kinds of work; takes $\frac{1}{4}$ inch shank bits, and has depth gauge. We can furnish many styles of Power Wood Boring Machines. Particulars upon application.

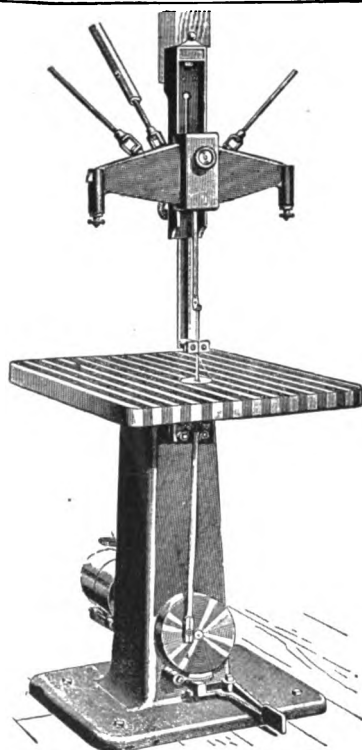


FIG. 1803. NO. 2 SCROLL SAW.

This machine is intended both for light and heavy scroll-sawing; is well made of good materials. Table measures 30 x 36 inches; has a patent adjustable strain that is new, simple and very effective. The Belt Shifter and Brake is placed at base of machine; the operator can stop and start machine instantly by a slight movement of the foot. Tight and Loose Pulleys are 6x3, and should make 1200 revolutions per minute. Price, complete, with $\frac{1}{2}$ doz. saws, wrenches, etc., \$64.50.



FIG. 1804. SAW SWAGERS.

- No. 8, for small circular saws, \$1.80.
 No. 9, for small and medium circular and mill saws, \$2.25.
 No. 1, for large circular saws, \$2.70.

SCROLL SAW BLADES.

FIG. 1805. TURNING WEBS.

The Turning Webs have thin backs. The 7 and 8 inch sizes are used largely in foot power machines.

Length.	Each.	Dozen.	Gauge.	Width.
7 in.	\$0.11	\$1.13	22	$\frac{1}{8}$ to $\frac{1}{4}$
8 "	.12	1.17	22	$\frac{1}{8}$ " $\frac{1}{4}$
10 "	.13	1.23	22	$\frac{1}{8}$ " $\frac{1}{4}$
12 "	.15	1.31	21	$\frac{1}{8}$ " $\frac{1}{4}$
14 "	.16	1.45	21	$\frac{1}{8}$ " $\frac{1}{4}$
16 "	.15	1.65	20	$\frac{1}{8}$ " $\frac{1}{4}$

FELLOE WEBS.

Felloe Webs are heavier by two to four gauge numbers than the Turning Webs. All of our Felloe Webs have thin backs.

Length.	Each.	Dozen.	Gauge.	Width.
10 in.	\$0.16	\$1.45	18	$\frac{1}{8}$ to $\frac{1}{4}$
12 "	.19	1.70	18	$\frac{1}{8}$ " $\frac{1}{4}$
14 "	.22	1.90	17	$\frac{1}{8}$ " $\frac{1}{4}$
16 "	.25	2.15	17	$\frac{1}{8}$ " $\frac{1}{4}$
18 "	.28	2.45	17	$\frac{1}{8}$ " $\frac{1}{4}$
20 "	.30	2.70	17	$\frac{1}{8}$ " $\frac{1}{4}$

FAY'S PATENT SCROLL SAWS.

These Scroll Saws are made from 13 to 16 gauge in thickness; they are run without strain, have thin backs, and require no setting.

Length,	10 in.	12 in.	14 in.
Each,	\$0.25	\$0.30	\$0.35
Dozen,	2.25	2.75	3.25

We can furnish when required, Scroll Saws of any length, width or thickness.

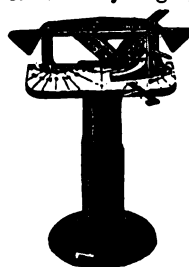


FIG. 1806.

UNIVERSAL TRIMMER.

This machine is used—or rather is intended to be used—by all classes of wood workers. For pattern work of all kinds they have come to be recognized as a necessity. As much work can be done with a good Trimmer in one hour, as can be done with saw and

plane in ten—and better work, too.

There is no better style of Trimmer in the market; the one illustrated here is the American Machinery Co's Universal Trimmer. It is, we believe, by far the best made of its class, containing all advantages and latest improvements.

Descriptive circular upon application.

A LITTLE OF EVERYTHING.

The contents of the following pages explain the above title—and themselves. Many of the goods shown are regular stock goods, displayed in this way for the sake of expediency. Others we sell from time to time, the demand not being

sufficient to warrant our carrying them in stock. And still another class of Machines and Appliances are shown, merely to offer suggestions as to what may be obtained in the line—or kindred lines—represented.

SPECIAL SERVICE.

We are often permitted to be of service to our customers and friends, in the way of furnishing information and professional (?) advice, especially in regard to goods that are odd and uncommon.

In this connection, we might say that articles in the line of Tools, Machinery and Supplies that might be considered uncommon with others, are—many of them—every-day subjects with us.

We might also say that what we DON'T know, would fill a great many large sized books; and while we will gladly impart such information as we possess, we cannot be expected to give something we have not.

As examples of the calls made upon us, we print here a few extracts from letters re-

cently received. Notice that the subjects are quite diversified. All of these matters were taken care of, we believe, to the satisfaction of our correspondents.

COARSE FLINT.—"We are making a small Water Filter. Can you advise us where we can get very coarse ground Quartz or Flint, same as is used for sand belts, but much coarser?"

EDGING MACHINE.—"We need a Machine for trimming off the edges of boxes, made of very thin stuff like cigar boxes."

PHOTOMETER.—"Where can I get an Instrument for measuring the lighting power of gas. I think it is called a Photometer."

BOX TRIMMINGS.—"We are figuring to get an order for ten

thousand fancy toilet boxes. Can you put us on the track of some concern, who make small nickel-plated and gilt trimmings suitable for such work."

THIN METAL.—"We want for testing purposes, a small quantity of Sheet Brass or Steel, about 2 inches wide, and .0005 ($\frac{1}{2000}$ "') thick."

STEEL DISCS.—"I require a large number of Friction Rollers; these are small steel discs, from $\frac{1}{8}$ to $\frac{5}{8}$ inch diam., and about $\frac{1}{8}$ thick. Please name me prices on a Power Punching Machine, with punches and dies $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{5}{8}$. The dies and punches should be made so that a number of discs could be punched at once."

Instead of selling a Machine, we referred him to a manufacturer in another line, who, in punching out holes, produced vast quantities of just such discs as our inquirer wanted, with the result that manufacturer No. 1 is buying his discs for less than one-half the price of the sheet steel; and manufacturer No. 2 is getting a good price for what was formerly waste, or scrap.

MORAL.

We Got Left—But Virtue Is Its Own Reward.

GOOD CASTINGS.

Manufacturers often find it difficult to obtain Good Castings; there are more foundries making castings, than there are making *good* castings.

We use large quantities, all of our work being of a nature that calls for good Castings. If you are not being suited, perhaps we can help you out.

SPECIAL NOTICE.

In writing us, always give as full particulars as is possible. Don't leave us to guess anything; we're poor guessers.

TWO MORE THINGS.

As the Special Service referred to on these two pages is largely gratuitous, we frankly state that we do not in any way bind ourselves, to take up difficult and complex matters, nor do we in any way guarantee that the information furnished will be absolutely correct.

Our experience has been large—and we simply offer to do our best.

It would cheer our weary path through this vale of tears, if correspondents would (a little more frequently) enclose stamped envelope for replies to their inquiries.



FIG. 1806a. NO. 5.

WOOD'S PATENT COMBINED BORING BIT AND COUNTERSINK.

We illustrate here a line of Boring Tools made by Morris Wood & Son. These goods are superior in every way, and are the best line of tools we know of, for the purposes for which they are designed.

The sizes in following tables are regular; can furnish any size to order. Prices upon application.

Fig. 1806a, No. 5, is a Combined Boring Bit and Countersink. This has a drill running through the center the entire length, which can be adjusted as desired. The drill is held in countersink at the shank, which is slotted. As the set screw is tightened down on shank, to hold countersink in machine, it presses the slotted shank together, which holds the drill firmly. These tools are tempered the entire length, and can be used up to the shank. The small drill can be replaced at little expense, should it break. These Countersinks are made with shanks $\frac{1}{2} \times 1\frac{1}{2}$. Total length of Countersink and drill 6 inches.

Price, with $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ inch drills,

Size,	$\frac{1}{8}$,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{2}$
Each,	\$1.50	1.50	1.50	1.75	1.75	2.00	2.00

Size,	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Each,	\$2.25	2.50	2.75	3.00	3.50	4.00



FIG. 1806b. NO. 7.

WOOD'S PATENT BORING BIT.

Fig. 1806b, No. 7, represents the Patent Boring Bit. These, like the Countersinks, are tempered the entire length and can be used up to the shank. They have a loose center with screw point, which can be taken out and the bit sharpened. If the

screw point breaks, it can be replaced at small cost. For machine work, it has many advantages over the ordinary solid point boring bit; can be used for boring sideways, and will also be found useful for dowel work. Bits, $4\frac{1}{2}$ inches long; shanks, $\frac{1}{2} \times 1\frac{1}{2}$.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{2}$
Each,	\$1.25	1.25	1.25	1.50	1.75	1.75	2.00

Size,	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Each,	\$2.25	2.50	2.75	3.00	3.50	4.00



FIG. 1806c. NO. 3.

WOODS' PATENT END BORING BIT.

Fig. 1806c, No. 3, represents a Patent Boring Bit for boring, endways of timber. It will be found an excellent tool for this purpose, having a sharper twist and no lips. Is made on the same principle as the Boring Bit (Fig. 1806a), and prices are also the same.



FIG. 1806d. NO. 13. MACHINE BIT.

Fig. 1806d, No. 13, represents a Machine Bit for wood, with shank $\frac{1}{2}$ inch diam. by $1\frac{1}{2}$ inches long. On page 91 will be found the same style of bit with straight shank.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1
Each,	\$0.30	.80	.90	1.00	1.20	1.40

Size,	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Each,	\$1.60	1.80	2.00	2.60	3.40	



FIG. 1806e. NO. 8. COUNTERSINK.

Fig. 1806e, No. 8, shows a Taper Countersink; this can be used for either wood or iron. Price, with $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ inch drills, \$1.50. Total length, $4\frac{1}{2}$ inches; shank, $\frac{1}{2} \times 1\frac{1}{2}$.



FIG. 1806f. NO. 9. PLUG CUTTER.

Fig. 1806f, No. 9, is used for cutting wooden plugs. It is one of the best tools of this kind. Shank, $\frac{1}{2} \times 2$.

Size, $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Each, \$1.25	1.40	1.50	1.75
Size, $\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	1
Each, \$2.00	2.25	2.50	3.00



FIG. 1806g. No. 12.

SCREW SHANK DRILL BIT FOR PRYBIL BORING MACHINE.

These Drill Bits are milled, suitable for boring wood, and are superior to the twist drill.

Size, $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Doz. \$6.60	7.80	8.40	9.60	10.80

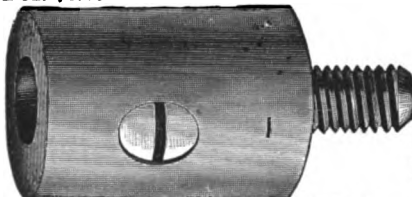


FIG. 1806h. NO. 1. CHUCK FOR PRYBIL BORING MACHINE.

Price, \$1.00.

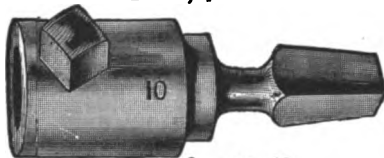


FIG. 1806k. NO. 10.

CHUCK FOR BRACE. Price, \$1.25.



FIG. 1806l. NO. 9.

VIBRATING MORTISE BIT.

Shanks, $\frac{1}{2} \times 2$. Sizes, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$.
Price, per doz., \$9.00.



FIG. 1806m. NO. 44. ROUTER BIT.

The above cut represents a Router Bit. Shanks are $\frac{1}{2} \times 1\frac{1}{2}$.

Size, $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Doz. \$5.40	5.40	6.00	7.20	8.40
Size, $\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1
Doz. \$10.80	12.00	13.80	15.60	18.00



FIG. 1806n.

LIGHTNING GASKET PACKING.

We consider this an article of great merit. This Packing consists of a solid cord $\frac{1}{4}$ inch diam., and sleeve joints to fit. It is suitable for making gaskets of any size or shape. In one minute a gasket or ring can be made that will fit any size Hand-hole, Man-hole, Union, or Flange Joint.

When applied, this Packing has a nearly uniform flange all around, only a little wider where sleeve joint covers overlapping end. It is unvulcanized, and can be built up to any required thickness, or can be reduced to as narrow flange as required by stretching. When compressed, the flange will be about thus:—If $\frac{1}{4}$ thick, $\frac{1}{2}$ inch flange; if $\frac{3}{8}$ thick, $1\frac{1}{2}$ inch flange, etc.

Cold, as well as Steam Joints, can be made with this Packing. It takes the place of fibrous cloth insertion, or pure rings and gaskets, and there is no waste.

In 10 lb. boxes, 70 cents per lb.; smaller quantities, 80 cents per lb.

MECHANICS' AND AMATEURS' WORK BENCHES.

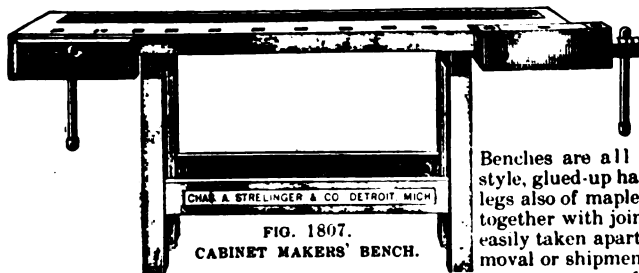


FIG. 1807.

CABINET MAKERS' BENCH.

We show here a very complete line of Work Benches for Cabinet-makers, Carvers, Amateurs, etc. These

Benches are all made in first-class style, glued-up hard maple tops, with legs also of maple. They are all put together with joint bolts, and can be easily taken apart and crated for removal or shipment.

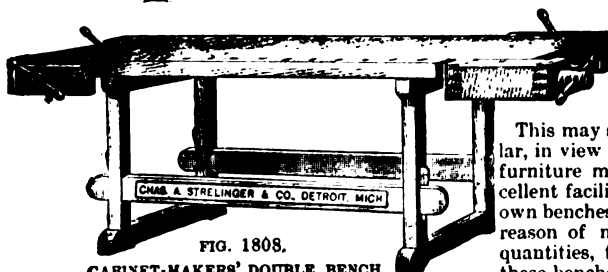


FIG. 1808.

CABINET-MAKERS' DOUBLE BENCH.

Over eight hundred of these have been sold to the different furniture manufacturers in Grand Rapids, Mich.

This may seem somewhat singular, in view of the fact that these furniture manufacturers have excellent facilities for making their own benches if they choose to. By reason of making them in large quantities, the manufacturers of these benches can furnish them at a less price than they can be made for in small lots.

The Cabinet-makers' Bench, Fig. 1807, is the style most commonly used. The regular bench, No. 1, is 25 inches wide (with 14 inch maple top), 6½ ft. long, and 34 in. high. Price, \$12.00..

No. 2, style of No. 1, 6½ ft. long by 30 inches wide, 16 inch maple top. Price, \$13.00.

No. 3, style of No. 2, 7 ft. long by 30 inches wide, 16 inch maple top. Price, \$14.00.

The Cabinet-makers' Double Bench, Fig. 1808, is designed for use in factories where space is limited. Is also well adapted for special or large work; is 7 ft. long, 37 inches wide, with 11 inch pine center in top. Frame is now put together with joint bolts, instead of wooden keys as shown in cut. Price, \$20.00.

The Carvers' Bench, Fig. 1809, is similar to the Cabinet-makers', but 5½ ft. long, and has no side vice. Price, \$11.00.

The Amateur Bench, Fig. 1810, was especially designed for use in manual training schools, and we sell a great many of them for gentlemen's and youths' home use. Is strong and well made; width 20 inches, with 13 inch glued-up maple top; length, 4½ ft. We sell more of these without the drawers and cupboard than with. Price of Plain Bench, \$8.00; Price, with drawers, etc., as shown in cut, \$12.00.

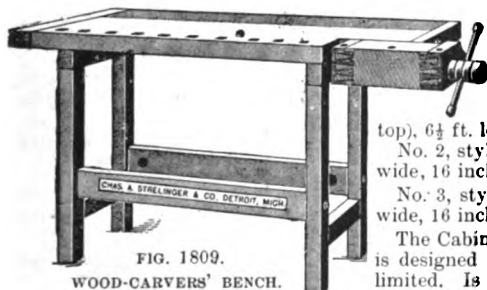


FIG. 1809.

WOOD-CARVERS' BENCH.



FIG. 1810.

AMATEUR OR HOUSE BENCH.

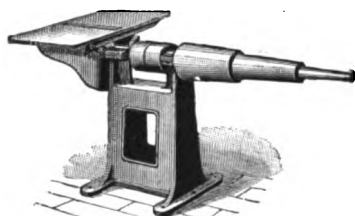


FIG. 1811. SANDING MACHINE.

The drums are 12, 8, 5 and 2 inches diameter. Flat work is done upon the table. Sand paper used in this way has every grain brought in contact with the work.

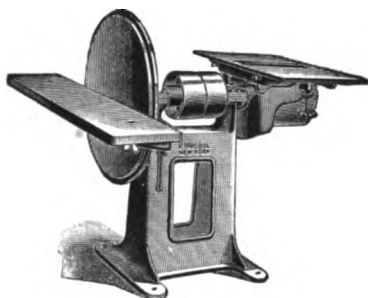


FIG. 1812. DRUM AND DISC SANDER.

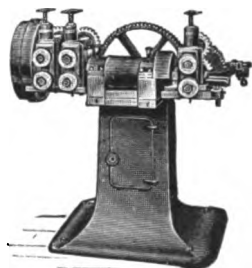


FIG. 1813. DOWEL MACHINE.

On page 483 will be found other tools for this work. The machine shown here is of the style adapted for larger work, such as curtain rolls, rods, etc., etc. These machines are made in three sizes, having capacity up to 1½, 1¼ and 2 inch respectively.

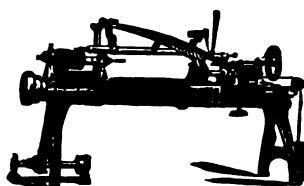


FIG. 1814. GAUGE LATHE.

This is known as a Back Knife Gauge Lathe, and is adapted to turning chair stock, furniture work, carriage hubs, fork and chisel handles, etc., etc.



FIG. 1815. TWIST MACHINE.

For making all sorts of Spiral or Rope Moulding, either straight, tapered, curved or oval. Any degree of twist is made, from one turn in 1½ inch to one in 10 inches.



FIG. 1816. BEVEL SAW TABLE.

Tips from square to 44 degrees on one side, and to 15 degrees on other. Position of saw not altered. Uses 16 inch saw.

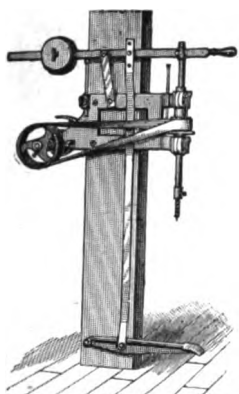


FIG. 1817.

UPRIGHT BORING MACHINE.
Works either by hand or foot.
Movement of Spindle is 12 inches.

This is used for making Corner Blocks or Rosettes, turning out 25 to 30 per minute. One set of Cutters can be used for quite a number of different designs.



FIG. 1818. ROSETTE MACHINE.



FIG. 1819. HICKORY AND LIGNUMVITAE MALLETS.

These Mallets are made of good, sound, clean stock, and are much superior to the common run. Our

Lignumvitae Mallets are unusually choice. We can also furnish Stone-cutters' and Tinnners' Mallets made of the finest second growth hickory. On Mallets Nos. 1 to 3, the handles are threaded and screwed in; on other sizes the handles are driven in.

No.	HICKORY.		LIGNUMVITAE.		Size.
	Each.	Dozen.	Each.	Dozen.	
1	\$0.28	\$2.75	\$0.55	\$5.50	4x6
2	.20	2.00	.40	4.00	5½x5½
3	.18	1.60	.35	3.00	3x5
4	.15	1.40	.30	3.00	2½x4½
5	.12	1.10	.25	2.50	2½x4
6	.12	1.00	.22	2.25	2½x3½
7	.10	0.90	.20	2.00	2x3½
8	.10	0.85	.18	1.80	1½x3

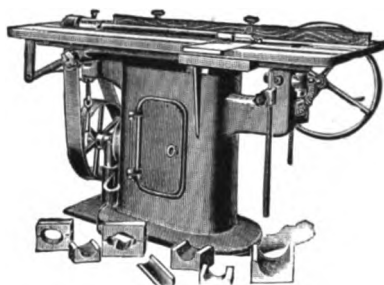


FIG. 1820. CORE BOX MACHINE.

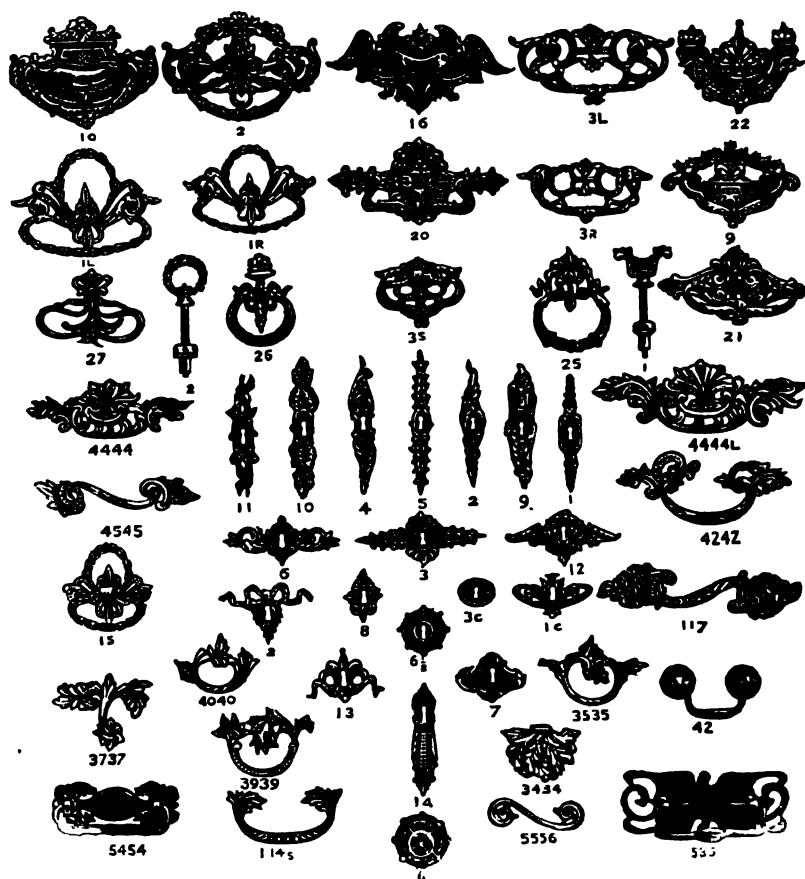
This is adapted to facilitate the construction of Patterns, Core Boxes, Pulley Bushings, etc. On some classes of work it will do as much in ten minutes as can be done by hand in a day. Will cut grooves from ¼ inch to 20 inch diameter, any length. Descriptive circular and prices upon application.



FIG. 1821. CLAMP HORSES.

These have hard maple beam 3½ x 4 inches, and double-iron clamp head, with 1½ inch screw; will open 6 ft.

Per pair, \$7.00.



CABINET TRIMMINGS.

These goods are beautiful in finish and design. We carry in stock the Gold finish, and can furnish any other style of finish to order; this, however, on small quantities entails extra expense. As an aid in making selections, we print size over all—giving first length, then depth—and have also prefixed the most popular styles with a *.

DRAWER PULLS OR HANDLES.

No.		Each.	Dozen.	Size.
10	large.....	\$0.55	\$5.50	5x4
*2	".....	.50	5.00	5½x2½
16	".....	.50	5.00	2½x3½
*3L	".....	.30	3.00	5½x2½
22	".....	.37	3.70	4½x3½
*11L	".....	.30	3.00	5x3½
*1R	medium...	.20	2.00	4½x3
20	large.....	.45	4.50	6x3
*3R	medium...	.20	2.00	4½x2½
9	".....	.34	3.40	4½x3
*27	small.....	.23	2.30	3½x2½

DRAWER PULLS OR HANDLES.
CONTINUED.

No.	Each.	Dozen.	Size.
*26 small.....	\$0.24	\$2.40	2½x3½
*38 ".....	.20	2.00	3x2
*25 ".....	.25	2.50	2½x3½
21 medium....	.30	3.00	5x1½
*444S ".....	.25	2.50	5x2
444L large....	.35	3.50	7x2½
*454S medium..	.25	2.50	5x1½
4242 large....	.25	2.50	5x2½
*1S small.....	.20	2.00	3x3
117 Iron.....	.12	1.20	6½x1½
3737 small....	.18	1.80	3x2½
4040 ".....	.12	1.20	3x1½
*3939 ".....	.18	1.80	3x2½
*3434 ".....	.16	1.60	3x1½
5454 medium...	.30	3.00	4x1½
114S small....	.15	1.50	4x1½
6 Iron Knob..	.10	.90	1½ diam.
5556 small....	.10	1.00	3x1
3535 ".....	.14	1.40	2½x2½
42 ".....	.20	2.00	3½x1½
585 large.....	.50	5.00	5½x2½

ESCUTCHEONS.

No.	Each.	Dozen.	Size.
*11	\$0.10	\$1.00	1x4½
10	.12	1.20	1x4½
*4	.08	.80	1x4½
5	.10	1.00	1½x1½
2	.08	.80	1x4½
9	.09	.90	1x4½
*1	.08	.80	1x4
*6	.09	.90	4x1½
*3	.10	1.00	4x1½
12	.08	.80	3½x1½
*2	.09	.90	3x2
*8	.05	.50	1½x1½
3C	.07	.70	1½x1
*1C	.08	.80	2½x1½
13	.09	.90	2½x1½
6½	.05	.50	1½ diam. iron
7	.08	.80	2x1½
Escutcheon and Pull combined.			
*14	.20	2.00	4x3½

TOILET SCREWS.

No.	Each.	Dozen.	Size.
2	\$0.20	\$2.00	1½x4
1	.19	.90	1½x3½

Fig. 1831 is arranged to be fitted to any wood turning lathe. Will do round, oval, square, polygonal and octagon work; many kinds of work can be done at one-tenth the ordinary cost. Cutters are the same as those

used in a lathe. The machine is made of iron. The table is 6 inches wide and 12 inches long. The machine is made of iron. The machine is made of iron.



Samples of Work done by this Machine.

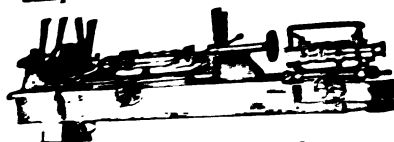


FIG. 1831. BOSTON OCTAGON WOOD TURNING MACHINE.
Circular and full description upon application.

FIG. 1832. DIE SINKING MACHINE.



Useful for all kinds of drilling and milling operations; especially designed for use in tool rooms. Vertical movement of spindle 3½ inches. Table has both transverse and longitudinal movement of 4½ inches, it also has rotary movement, and a vertical adjustment of 6 inches. Weight 650 lbs. Price \$300.00.

LATHE AND PLANER TOOLS.

Since printing page 224, we have increased our line, adding eight new styles of Lathe and four of Planer Tools, thus making the most complete line yet presented. These tools are of English tool steel, nicely made, ground, and carefully tempered ready for immediate use. Prices remain the same, excepting $\frac{1}{2} \times \frac{1}{2}$ size.

We have deemed it expedient to change the numbers, but if customers in ordering will mention figure number, it will prevent confusion. If figure numbers are not mentioned, orders will be filled as per descriptions on page 224.

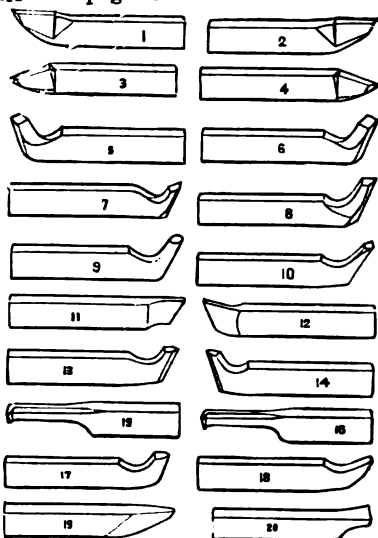


FIG. 1833. LATHE TOOLS.

DESCRIPTION OF LATHE TOOLS.

- | | |
|-------------------------------------|---------------------------|
| No. 1. L. H. Side. | No. 10. Water Polishing. |
| 2. R. H. Side. | 11. Cutting-off. |
| 3. L. H. Bent Side. | 12. Bent Cutting-off. |
| 4. R. H. Bent Side. | 13. Straight Thread. |
| 5. L. H. Diamond. | 14. Bent Threading. |
| 6. R. H. Diamond. | 15. Inside Boring. |
| 7. Bent R. H. Diamond Point. | 16. Inside Threading. |
| 8. R. H. Half Diamond Point. | 17. Bull Nose. |
| 9. Round Nose. | 18. Finishing or Necking. |
| No. 20. For Truing up Centres, etc. | 19. Scaling. |

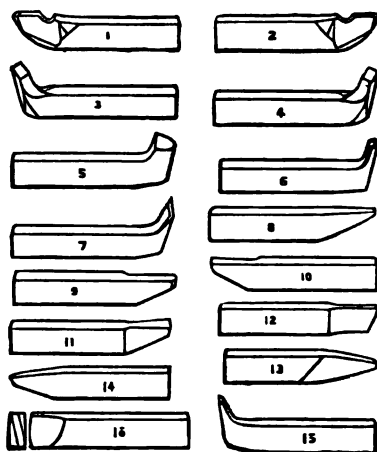


FIG. 1834.

PLANER AND SHAPER TOOLS.

DESCRIPTION OF PLANER AND SHAPER TOOLS.

No.	No.
1. L. H. Side.	10. L. H. Siding.
2. R. H. Side.	11. For Finishing in corners.
3. L. H. Diamond.	12. Cutting-off.
4. R. H. Diamond.	13. R. H. Bevel.
5. Bull Nose for heavy cuts.	14. L. H. Bevel.
6. Gouge Nose.	15. Smoothing Tool for Cast Iron.
7. Broad Nose or Stocking.	16. Smoothing Wrought Iron or Steel.
8. Scaling.	
9. R. H. Siding.	

Size.	Set of 12.	Set of 20.	Single Tools, each.
$\frac{1}{2} \times \frac{1}{2}$	\$2.00	\$3.30	\$0.25
$\frac{3}{4} \times \frac{3}{4}$	3.00	5.00	.30
$\frac{1}{2} \times \frac{1}{2}$	3.00	5.00	.30
$\frac{1}{2} \times 1$	5.40	9.00	.55
$\frac{3}{4} \times 1\frac{1}{2}$	8.00	13.30	.80
$\frac{1}{2} \times 1\frac{1}{2}$	10.00	16.65	1.00
$\frac{3}{4} \times 1\frac{1}{2}$	11.50	19.10	1.15

Prices of Lathe, and Planer and Shaper tools are the same, but Planer and Shaper tools are not made in the first two sizes.

Unless otherwise specified, orders for sets of 12 Lathe tools will be filled with Nos. 1, 2, 4, 5, 6, 9, 11, 13, 14, 15, 16, 19; and sets of 12 Planer and Shaper tools with Nos. 1, 2, 3, 4, 7, 8, 9, 10, 12, 13, 14, 16.



GOODELL DRILL CHUCK.

Somewhat similar in style to the Almond Drill Chuck, Fig. 385, page 97, but not so accurately and finely made. They are, however, strong, durable and finely finished, and the prices are very moderate. We have them with $\frac{1}{2}$ and $\frac{3}{4}$ straight shanks. With

FIG. 1835. Morse Taper Shanks at an advance of 50 cents each.
No. 14, \$1.25, for drills 0 to $\frac{1}{8}$ inch.
" 15, 1.75, " " 0 to $\frac{1}{4}$ "
" 16, 3.25, " " 0 to $\frac{1}{2}$ "
Postage, 4, 6 and 14 cts. respectively.

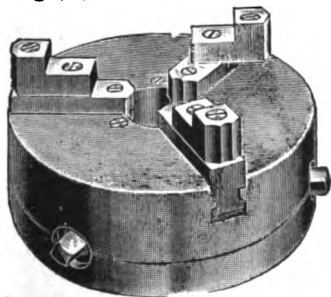


FIG. 1836.

UNION GEARED SCROLL CHUCK.

This is a new style Chuck of the same type as shown on page 99, the novel feature being the Patent Reversible Jaws. This style of jaw has been used with good success for many years on Lathe Chucks.

In nearly all cases it takes the place of two sets of jaws, and costs practically no more than the regular Geared Scroll Chuck with one set of jaws. We guarantee these Chucks in every particular, both as to workmanship and material.

Diameter.	Price.	Diameter Hole.	Diameter Face Plate.
2 $\frac{1}{2}$	\$6.00	$\frac{1}{2}$	
3	8.00	$\frac{3}{4}$	2 $\frac{1}{2}$
4	9.60	$\frac{1}{2}$	3 $\frac{1}{2}$
5	12.00	$\frac{3}{4}$	3 $\frac{1}{2}$
6	14.30	1 $\frac{1}{4}$	4 $\frac{1}{2}$

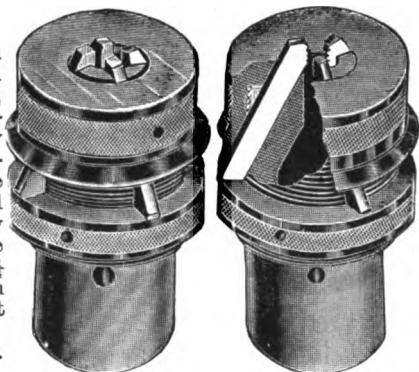


FIG. 1837. ADJUSTABLE THREAD CUTTING AND MILLING TOOL.

For brass finishers and machine work; easily adjusted, and when adjusted, so firmly clamped into position as to maintain its size and do as good work as a solid die or mill. The parts are few and simple, adjustment positive; cutters may be removed instantly, either for grinding or changing. Adjustment made from one size to another in almost no time. The blades can be reground until they are used up.

No.	Price, Complete.	Thread and Mill.	Size Blades.	Blades Per Set.
1	\$12.00	$\frac{1}{4}$ to $\frac{1}{2}$	$\frac{1}{8}$ x $\frac{7}{8}$	\$0.65
2	14.00	$\frac{1}{2}$ to 1	$\frac{1}{4}$ x $\frac{3}{4}$	.70
3	16.00	1 to 1 $\frac{1}{2}$	$\frac{1}{2}$ x $\frac{3}{4}$	.75

The price for extra blades fitted, but not finished.

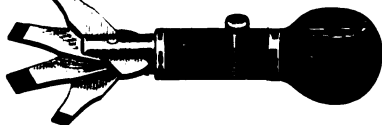


FIG. 1838. BILLINGS & SPENCER POCKET SCREW DRIVER.

Four sizes of screw drivers in one handle. A handsomely made and well finished tool, useful for electricians, the household, sportsmen, and any one desiring a handy tool. Price, \$0.75; postage, 6 cts. Length, closed, 3 $\frac{1}{4}$ inches.

TELEPHONES.

Since the expiration of some of the principal telephone patents, there has been a perfect flood of Instruments of various kinds placed upon the market, good, bad and indifferent. A great many of these are offered at prices which preclude the possibility of their being any good. The line shown here is well adapted for general purposes. We will guarantee Instruments fully, as regards workmanship, quality of materials used, and general efficiency. We do not believe that first-class goods can be bought at lower prices.

In constructing telephone lines, we recommend metallic circuits (two wires), as it gives better results than one wire and grounding.

Prices are for single Instruments, as shown in cuts, without Battery. Batteries \$0.60 per cell extra.

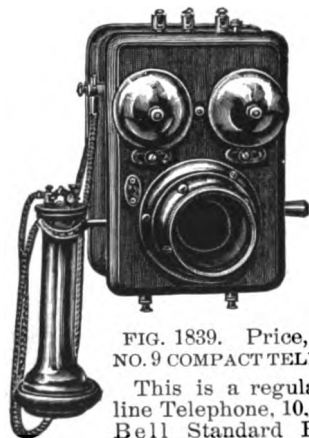


FIG. 1839. Price, \$12.50.
NO. 9 COMPACT TELEPHONE

This is a regular main line Telephone, 10,000 ohm Bell Standard Receiver and Long Distance Transmitter.

ALLSOP'S Book on Telephones, one of the best books on the subject. Price, post-paid, \$2.00.



FIG. 1840. OAK BRACKET.
Each, 3 cents; per 100, \$2.00.

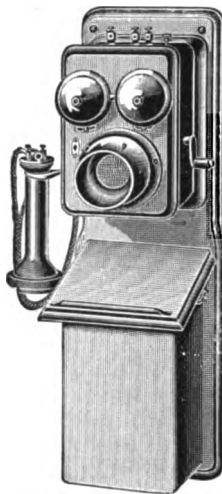


FIG. 1841. NO. 10 TELEPHONE.
Price, \$14.50.

This is one of the best selling Telephones we have, and is used for exchange work, private line and factory purposes.

Size of back board $7\frac{1}{2} \times 25$ inches.

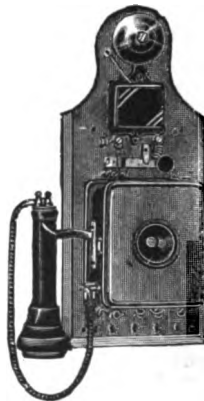


FIG. 1842.
NO. 20
BATTERY CALL
TELEPHONE.
Price, \$9.50.

This is for factory or store-house use, but can be used as a general Telephone.

FIG. 1843.
INSULATOR.

Pony Glass, each,
3 cts.; per 100, \$2.00.
No. 4, Porcelain, per
doz., 30 cents.



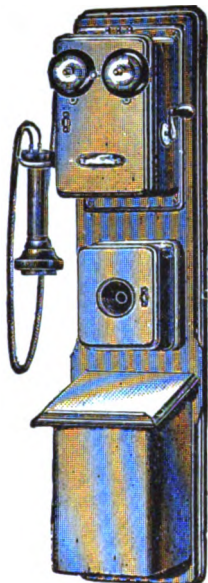


FIG. 1844. PRICE, \$16.00.
MAIN LINE BLAKE TELEPHONE.

Black walnut back-board, $7\frac{1}{2} \times 32$ in. Furnished with either Long Distance or Blake Transmitter, Automatic Switch Hook, Standard Compound Receiver.



FIG. 1845. Price, \$3.75.
LONG DISTANCE TRANSMITTER.
Considered by many as the peer of battery transmitters. Requires no adjusting, and is always ready for use.
BLAKE TRANSMITTER—Price, complete, \$4.00.

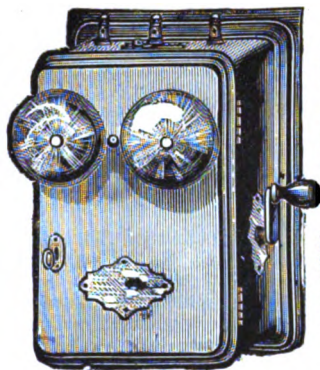
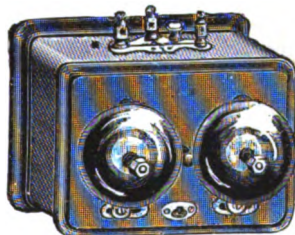


FIG. 1846. MAGNETO BELL.
Price, each, \$4.50. 10,000 ohm.



Price, each, \$2.50.

FIG. 1848. EXTENSION BELL.
For placing in different parts of a building as a call to the telephone, when no one is in the room where telephone is located.

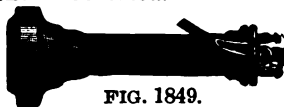


FIG. 1849.
RECEIVER, NO. 1 STANDARD.
Standard No. 1, Compound Magnet, \$1.25. No. 2 Receiver, Compound Magnet, \$1.00. No. 3 Receiver, Bar Magnet, \$0.64.

MECHANICAL BOOKS.

We present herewith, a well selected line of Mechanical books. Any of these will be sent by mail on receipt of price.

FOUNDRY PRACTICE.

The Iron Founder, by Simpson Bolland, over 300 engravings, 382 pages; cloth, \$2.50.

The Practical Brass & Iron Founders' Guide, by James Larkin, 394 pages; cloth, \$2.50.

American Foundry Practice, by Thomas D. West, 408 pages; cloth, \$2.50.

Moulders' Text Book, being part II of American Foundry Practice, by Thomas D. West, 461 pages; cloth, \$2.50.

The Pattern Makers' Assistant, by Joshua Rose, M. E., 250 engravings, 224 pages; cloth, \$2.50.

The Encyclopedia of Founding & Dictionary of Foundry Terms, including processes for brass, bronze, steel, bell, statue, iron and pipe founding, also aluminum, dipping, lacquering, galvanizing, etc., etc., by Simpson Bolland, \$3.00.

METALLURGY.

The Metal Workers' Handy Book of Receipts, by William T. Brant, 530 pages; cloth, \$2.50.

Electro Plating, by J. W. Urquhart, 220 pages; cloth, \$2.00.

Practical Blacksmithing, in four volumes; cloth, price per vol., \$1.00.

CHEMICAL ANALYSIS.

A Manual of Practical Assaying, by H. Van F. Furman, E. M., 390 pages; cloth, \$3.00.

Assayers' Guide, by Oscar M. Lieber, 233 pages; cloth, \$1.50.

SHEET METAL WORK.

The Art of Coppersmithing, by John Fuller, 327 pages; cloth, \$3.00.

Metal Workers' Pattern Book, 520 engravings, 242 pages; cloth, \$5.00.

The Sheet Metal Workers' Instructor, by Reuben H. Warn, \$3.00.

PUMPS, HYDRAULIC AND WATER SUPPLY.

Pumps & Pumping, by M. P. Bale, \$1.00.

A Practical Treatise on Hydraulic and Water Supply Engineering, by J. T. Fanning, \$5.00.

Treatise on Water supply, Drainage and Sanitary Appliances of Residences, by F. Colyer, \$1.50.

Pumping Machinery, by W. M. Barr, \$5.00.

CONSTRUCTIVE AND CIVIL ENGINEERING.

The Theory of Transverse Strains, by R. G. Hatfield, 630 pages, \$5.00.

The Architects' & Builders' Pocket Book of Mensuration, Geometry, etc. 880 pages, by Frank E. Kidder, \$4.00.

The Civil Engineers' Pocket Book, by J. C. Trautwine, Jr., 866 p., \$5.00.

MISCELLANEOUS.

Vade Mecum, a general work of reference for all sorts of people, compiled by D. E. Dickson; Electrical Department by Thomas G. Greer, 480 pages, \$2.50.

Treatise on Wire, Its Manufacture and Uses, by J. Bucknall Smith, 400 pages, \$3.00.

Cements, Pastes, Glues and Gums, by H. C. Standage, 164 pages, \$1.00.

Manual on Lime and Cement, by A. H. Heath, 215 pages, \$2.50.

Experimental Science, by George M. Hopkins, 840 pages, 800 illustrations, \$4.00.

The Techno-Chemical Receipt Book, containing several thousand receipts, 495 pages; cloth, \$2.00.

The Gas Engine, by Dugald Clark, 278 pages; cloth, \$2.00.

Fuel: Its Combustion and Economy, 354 pages; cloth, \$1.50.

Factory Accounts, Their Principles and Practice, by E. Garcke and J. M. Fells, 264 pages; cloth, \$2.50.

MECHANICAL ENGINEERING.

The General Machinist, 204 p \$2.00

Milling Machines and Processes, by Paul M. Haslup, 352 pages; cloth, \$5.00.

Gas Lighting & Gas Fitting, by William Paul Gerhardt, 50 cents.

Boiler Making for Boiler Makers, by W. H. Ford, 233 pages, \$1.00.

The English & American Mechanic (an every-day hand book for the workshop and factory, containing several thousand rules, receipts and tables) 476 pages, \$2.00.

Spon's Mechanics' Own Book, for handicraftsmen and amateurs, 700 pages; cloth, \$2.50.

Complete Practical Machinist, by Joshua Rose, 439 pages, \$2.50.

STEAM ENGINEERING.

The Engine Runners' Catechism, by Robert Grimshaw, \$2.00.

Modern Steam Engines, by Joshua Rose, \$6.00.

Steam Boilers, by Joshua Rose, \$2.50.

The American Steam Engineer, by Emory Edwards, \$2.50.

Stationary Steam Engine, by Prof. R. M. Thurston, \$1.50.

Twenty Years with the Indicator, by Thomas Pray, Jr., \$2.50.

Indicator Practice and Steam Engine Economy, by Frank F. Hemenway, \$2.00.

How to run Engines and Boilers, by E. D. Watson, \$1.00.

DRAWING AND DESIGNING.

Mechanical Drawing Self-Taught, by Joshua Rose, \$4.00.

Mathematical Instruments and How to use them, by F. E. Hulme, \$1.50.

Ornamental Draughtsman and Designer, by Robert Scott Burns, \$2.00.

PLUMBING, HEATING AND VENTILATION.

Plumbing and House Draining Problems, from the Sanitary Engineer, 244 pages; cloth, \$3.00.

Hints on the Drainage and Sewerage of Dwellings, by William Paul Gerhardt, \$1.50.

Hot Water Heating and Fitting, by William J. Baldwin, \$4.00.

Steam Heating for Buildings, by William J. Baldwin, \$2.50.

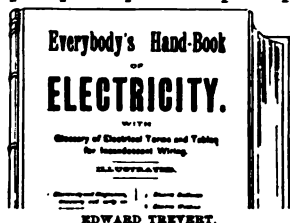
Steam Heating Problems, from The Sanitary Engineer, \$3.00.

Essays on House Heating, from The Metal Worker, 407 pages; cloth, \$3.00.

A new book by KENT. This is a new Mechanical Engineer's Pocket Book, containing 1087 pages. Similar to Haswell (See page 133) and is said to excel Haswell in a number of points, in construction of problems, and indexing. Handsomely bound, with Morocco cover, \$5.00.

ELECTRICAL BOOKS.

We print here a list of useful Instruction Books upon Electricity. Any of these books will be sent by mail post-paid upon receipt of price.



Dynamos and Electric Motors, 50 cts.

Everybody's Hand Book of Electricity; paper, 25 cts.; cloth, 50 cts.

How to Make Batteries; paper, 25c.

How to Make a Dynamo; paper, 12c.

Experimental Electricity; cloth, \$1.00

Electro-Plating; cloth, 50 cents.

Electricity and Its Recent Appliances; cloth, \$2.00.

Electric Railway Engineering; cloth, \$2.00.

Bell Fitting and Electric lighting; paper, 25 cents.

Electric Measurements; cloth, \$1.00.

How to Build Dynamo-Electric Machinery; cloth, \$2.50.

Randall's Practical Treatise on The Incandescent Lamp; cloth, 50 cts.

Prindall's Electric Railroad; paper, 50 cents.

Thomson's What is Electricity; paper, 25 cents.

Parker's Electric Motor Construction for Amateurs; cloth, \$1.00.

Bubler's Questions & Answers about Electricity; cloth, 50 cents.

Watson's Wiring Hand Book; cl. 75c.

Watson's How to Make a One Horse Power Motor or Dynamo, 50 cts.

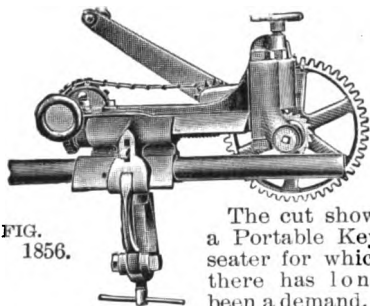
Watson's How to Make a Fifty Light Dynamo; cloth, 50 cents.

Cary's How to Make and Use a Telephone; cloth, \$1.00.

Bottone's Electric Bells and All About Them; cloth, 50 cents.

Bottone's Electric Motors and All About Them; cloth, 75 cents.

Bottone's Electrical Instrument Making for Amateurs; cloth, 50 cents.

FIG.
1856.

The cut shows
a Portable Key-
seater for which
there has long
been a demand.

It is a serious and expensive matter to take down any part of a line shaft to have a keyseat cut, and is also an expensive matter to chisel the same. This machine will mill keyseats any length in shafting from $1\frac{1}{2}$ to $4\frac{1}{2}$ inches; will cut in width from $\frac{1}{2}$ to $1\frac{1}{2}$ and to $\frac{3}{4}$ deep. An operator can cut a keyseat 12 inch long, $\frac{1}{2}$ wide, $\frac{1}{8}$ deep, in one hour, and other sizes in proportion. Price of machine, with 5 cutters, as per list below, \$38.75. Weight about 50 lbs.

PRICE OF CUTTERS.

Size,	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Each, \$	1.40	1.60	1.60	1.70	1.80

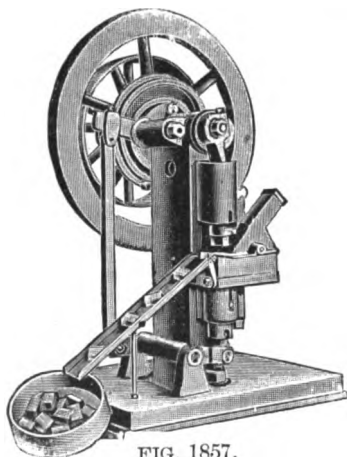


FIG. 1857.

TABLET COMPRESSING MACHINE.

For compressing all sorts of materials that are in powdered or flake

form into tablets. The largest size tablet or cake that this machine will form, is $1\frac{1}{2} \times 2 \times 1\frac{1}{2}$, varying with the material under treatment. This machine is used principally in pharmaceutical laboratories.



FIG. 1858.

SEAMLESS STEAM JACKET KETTLE.

These Kettles are used by butchers, confectioners, soap makers, glue boilers, tanners, chemical works, institutions, etc., etc. Can furnish them in sizes from 1 to 500 gallons. Prices upon application.

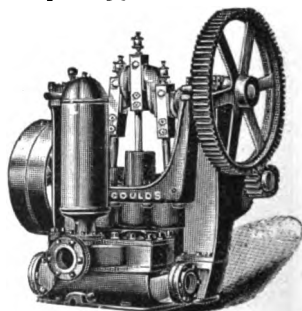


FIG. 1859. TRIPLEX POWER PUMP.

Among the advantages claimed for the Triplex Power Pump, are, first, the economical power consumption, and second, the very constant and uniform discharge. These Pumps are made in a great variety of sizes and styles. Are used for Boiler Feed, Hydraulic Pressure, Suction, Exhaust, Tank Service, Irrigating, Elevator, and Mine work.



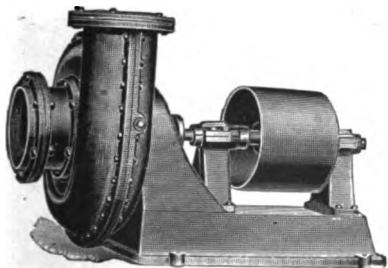
No. 1037.

No. 928.

FIG. 1860. AIR PRESSURE PUMPS.

These are a new style Pump, used for filling Pneumatic Tires; can also be used for filling Receivers and many other purposes.

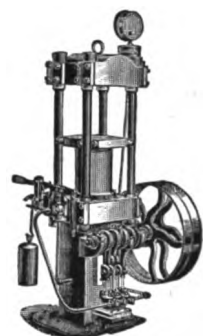
No. 1037 has 1½ inch Cylinder, 11 inch Stroke, weighs 2½ lbs.; price, \$2.00. No. 928 is much larger and heavier; has 3 inch Cylinder, 4 inch Stroke, weighs 10 lbs.; price, \$8.00. Pressure Gauge and Cock, 3¼ inch, \$3.00. The working parts of these Pumps are brass.

**FIG. 1861. CENTRIFUGAL PUMP.**

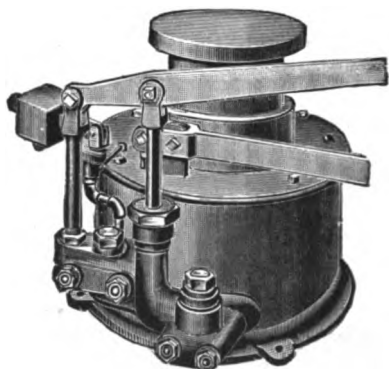
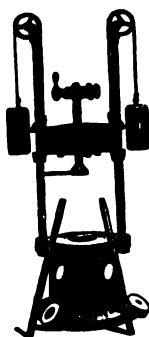
This type of Pump still holds its place as the only Water Lifting Machine that entirely answers the requirements of certain kinds of work. Can furnish these in iron or brass in different sizes, of capacities from 275 to 8000 gallons per minute.

FIG. 1862. HYDRAULIC PRESS.

Made in different sizes and forms from 70 to 3000 tons capacity.

**FIG. 1863. SCREW PRESS.**

Used for pressing shafts on to and from pulleys, gear wheels, etc., for straightening shafts and similar work. Made in two sizes; capacity of pressure, 20 and 75 tons.

**FIG. 1864. HYDRAULIC PRESS.**

Used largely by manufacturers of carriages and wagons for pressing on hub bands and pressing in boxes. Can be used to advantage for many purposes where pressure is required.

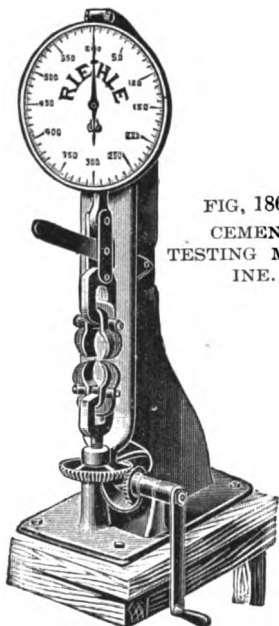


FIG. 1865.
CEMENT
TESTING MACH-
INE.

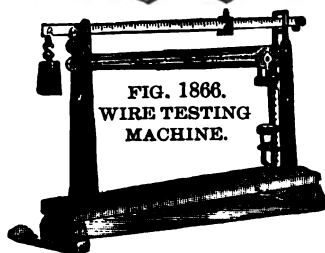


FIG. 1866.
WIRE TESTING
MACHINE.

GRINDERS.



FIG. 1867. CLIPPER GRINDER NO. 1.
Geared 8 to 1; Wheel 5 in. diam.
 $1\frac{1}{4}$ in. thick. Price, \$5.40.

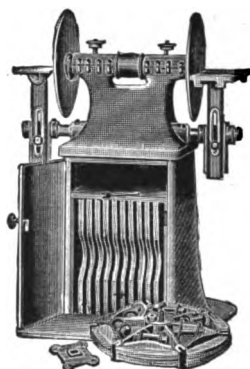


FIG. 1868. GARDNER GRINDER.

Intended principally for grinding flatsurfaces.

Will do rough work, and also finest kind of finishing.

The work produced is true and flat.

This is a great saver of files.



FIG. 1869. LITHOLOGICAL LATHE.

Used quite extensively in laboratories and schools, for grinding and polishing mineral specimens.

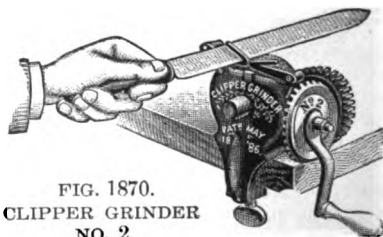


FIG. 1870.
CLIPPER GRINDER
NO. 2.

Household Grinder for sharpening carvers, scissors, etc. Price, \$1.80

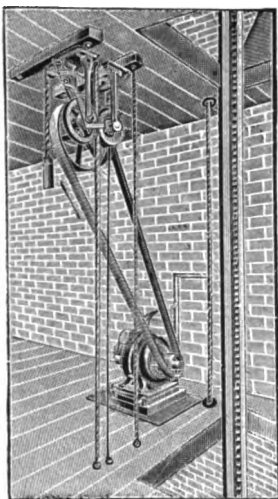


FIG. 1871. ELEVATOR RIG.

This is a convenient and ingenious arrangement for applying power to the ordinary style of elevator, operated by hand rope. Can be used in connection with steam or gas engine power, electric motor, etc.

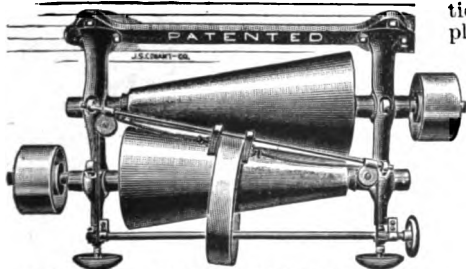


FIG. 1872. EVANS' FRICTION CONE.

Made in sizes transmitting 1 to 50 horse power. Best device known to give variations in speed. The Evans Co. also make a Friction Mitre Gear.

NOTE.—If you will take the pains to explain your wants as fully as possible it may save us both considerable trouble. You know what you want—or at least what you want to ac-

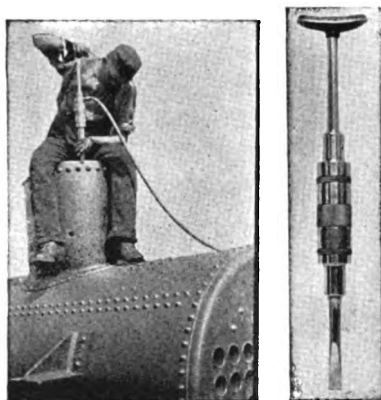


FIG. 1873. PNEUMATIC TOOL.

The King Valveless Pneumatic Tool can be used for many purposes, among which are the calking of boilers and ships, chipping and planishing metals, dressing and carving stone, and for use in mines and stone quarries. These tools are operated with compressed air, the working pressure ranging from 60 to 80 lbs.; thus causing the piston to make 10,000 strokes per minute. Description and prices will be sent upon application.

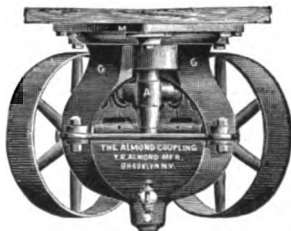


FIG. 1874. ALMOND COUPLING.

This is a quarter-turn motion to replace quarter-turn belts and bevel gears.

complish—we don't, and are poor "guessers."

Another good idea is to—sometimes—inclose a stamped, self-addressed envelope.

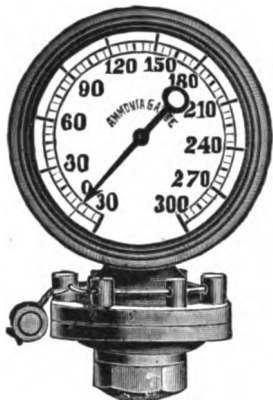


FIG. 1875. AMMONIA GAUGE.
Made entirely of iron and steel;
used for Ice and Refrigerator machines,
Acids and other substances
which affect brass.

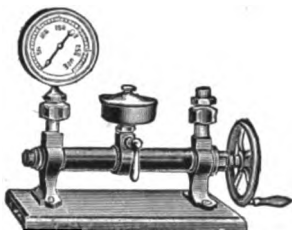


FIG. 1876. HYDRAULIC PUMP.
Used for testing Gauges; made in
a variety of sizes.

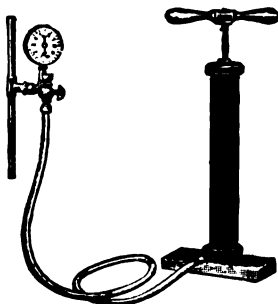


FIG. 1877. GAS FITTERS' PROVING
PUMP AND GAUGE.

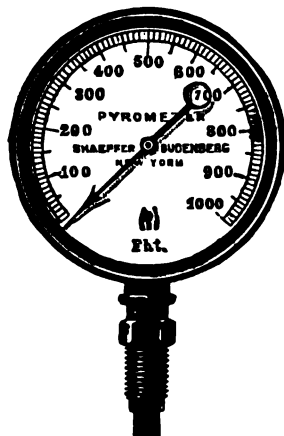


FIG. 1878. PYROMETER.

For taking temperatures up to 1500
degrees Fahr. Used for Japanning
and Annealing Ovens, and similar
work. Are made in different styles
and sizes.

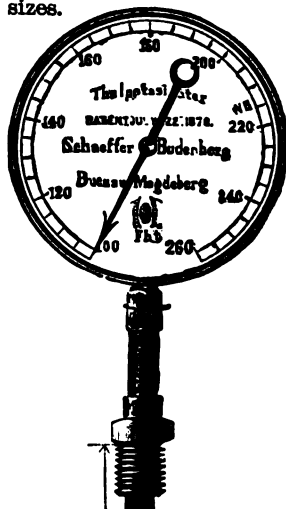


FIG. 1879. THALPOTASIMETER.
Takes the place of Glass Thermo-
meters where durability is a required
feature. Usually made to indicate
from 100 to 250 degrees Fahr.

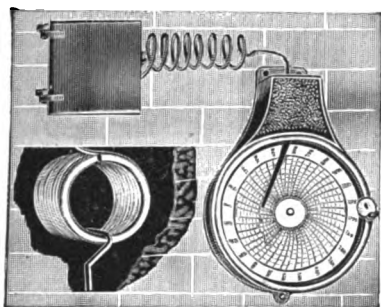


FIG. 1880.

RECORDING THERMOMETER.

Makes a continuous record day and night of the temperatures of heaters, dry kilns, etc., etc. The recording portion can be located at any convenient point outside of the room or kiln.

THERMOMETERS.

Can furnish Special Thermometers to order for Steam, Hot Water, Hot Air, Brine, Ammonia, Ovens, Vacuum Pans, Stills, Varnish makers, etc.



FIG. 1881. MINING COMPASS.

Graduated to half degrees, suspended in universal joint, $3\frac{1}{4}$ inch needle with stop, 7 inch clinometer. Price, complete in case, \$50.00.

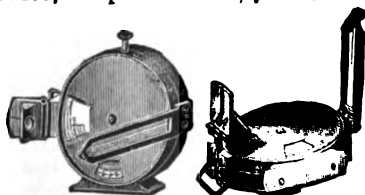


FIG. 1882. PRISMATIC COMPASS AND CLINOMETER.

Made in a variety of styles, ranging in price from \$11.00 to \$48.00.

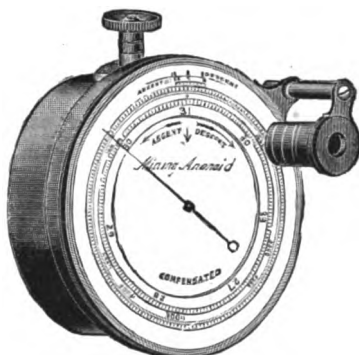


FIG. 1883. BAROMETER.

The Aneroid Barometer is used for measuring heights and atmospheric pressures. Made in sizes $1\frac{1}{4}$ to 5 inches diam.; in price from \$12.00 to \$70.00.

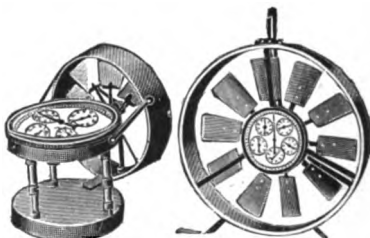


FIG. 1884. ANEMOMETER.

Used for measuring the velocity of air currents in mines, hospitals, tunnels, public buildings, sewers, etc. Are useful for sanitary and scientific purposes. Range in price from \$15.00 upwards.

FIG. 1885.

PEDOMETER.

Used to indicate distances walked. The Odometer is an instrument of a similar class and is attached to bicycles or vehicles of any kind to indicate the distance traveled.



FIG. 1886. WOOD BORING DRILL.

We carry these in stock in the ordinary lengths, as follows. The numbers indicate the sizes in 32ds of an inch.

No.	2	3	4	5	6	7
Ea.	\$0.12	\$0.12	\$0.12	\$0.13	\$0.14	\$0.18
Doz.	1.12	1.12	1.12	1.24	1.40	1.75
No.	8	9	10	11	12	13
Ea.	\$0.21	\$0.25	\$0.25	\$0.28	\$0.28	\$0.32
Doz.	2.10	2.45	2.45	2.80	2.80	3.15
No.	14	16	18	20	22	24
Ea.	\$0.32	\$0.35	\$0.38	\$0.42	\$0.45	\$0.49
Doz.	3.15	3.50	3.85	4.20	4.55	4.90

BELL HANGERS' AND ELECTRICIANS' DRILLS.

These are the same style as above, but made in long lengths. Can furnish other lengths to order.

	18 Inch.		24 Inch.		30 Inch.	
Size.	Each.	Doz.	Each.	Doz.	Each.	Doz.
$\frac{1}{8}$ "	\$0.49	\$4.90	\$0.63	\$6.30	\$0.77	\$7.70
$\frac{1}{4}$ "	.49	4.90	.63	6.30	.77	7.70
$\frac{3}{8}$ "	.52	5.25	.66	6.65	.84	8.40
$\frac{1}{2}$ "	.56	5.60	.70	7.00	.84	8.40
$\frac{5}{8}$ "	.63	6.30	.75	7.70	.90	9.10
$\frac{3}{4}$ "	.70	7.00	.84	8.40	.95	9.80
$\frac{7}{8}$ "	.84	8.40	.95	9.80	1.05	10.50
1"	.95	9.80	1.10	11.20	1.20	11.90

FIG. 1887.

CORNER BIT BRACE.

This tool is useful for all sorts of boring purposes, but is especially desirable for boring in close places. Is almost indispensable for plumbers, bell-hangers, electricians, etc. No. 8, \$2.40, 8 inch sweep; No. 10, \$2.75, 10 inch sweep.



FIG. 1888. ANGULAR BORER.

A strong, durable tool used in connection with any bit brace, for boring at an angle. Price, \$1.35; postage, 25 cents.



FIG. 1889. BIT BRACE EXTENSION.

Furnished in 12, 16 or 20 inch lengths. Price, each, \$1.00; postage, 15, 20 and 25 cents.

AUTOMATIC DRILL.

This is an invaluable tool for boring small holes in wood and is highly prized by pattern makers and all mechanics who have used it.

No. 1, \$1.25; No. 2, \$1.25; No. 3, \$1.65.

No. 1 is all metal, nickel plated; No. 2, same as No. 1, but with Rosewood handle; No. 3 (see cut), is practically the same excepting that drills are contained in head of handle, each in a separate compartment. 8 Drills are furnished with each Tool.

No.	1	2	3	4
Size, $\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{1}{8}$ "
No.	5	6	7	8
Size, $\frac{1}{4}$ "	$\frac{1}{4}$ "	$\frac{1}{4}$ "	$\frac{1}{4}$ "	$\frac{1}{4}$ "

Drills, per set, \$0.50; each, \$0.08. Postage on

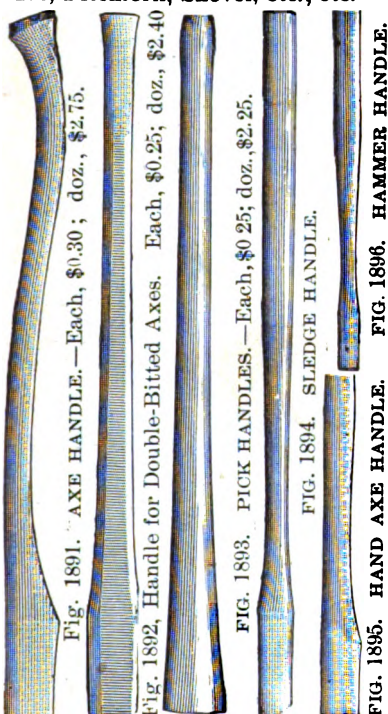
FIG. 1890. Tool, 10 cents.

HICKORY HANDLES.

In calling attention to our line of Hickory Handles, permit us to say, that we sell but one quality. The Handles illustrated and priced here—rather the handles we send out—are all made from best quality, *White, Selected, Second Growth Hickory*. The actual cost in time of renewing a handle in a tool, is usually more than the cost of a handle itself. Ninety per cent of the handles sold are of indifferent quality. Our Handles are uncommonly good, our prices on them uncommonly high, and we appeal only to that class of

trade who are willing to pay a good price for good handles.

We can furnish to order any special style of Handles wanted, and know a little something about other kinds of handles; such as Rake, Hoe, Pitchfork, Shovel, etc., etc.



SLEDGE HANDLE, Fig. 1894, is used for SLEDGES, MAULS, STRIKING HAMMERS, Etc.

30 inch, each, \$0.15; doz., \$1.35.

32 " " .16; " 1.45.

36 " " .18; " 1.75.

HAMMER HANDLE, Fig. 1896, Machinists', Small, 10 to 12 inch, each, \$0.07; doz., \$0.60. Regular, 14 to 18 inch, each, \$0.08; doz., \$0.80. Carpenters', each, \$0.08; doz., \$0.80.

HATCHET HANDLES, Fig. 1895, each, \$0.08; doz., \$0.80. Hand or Bench Axe, each, \$0.10; doz., \$1.00.

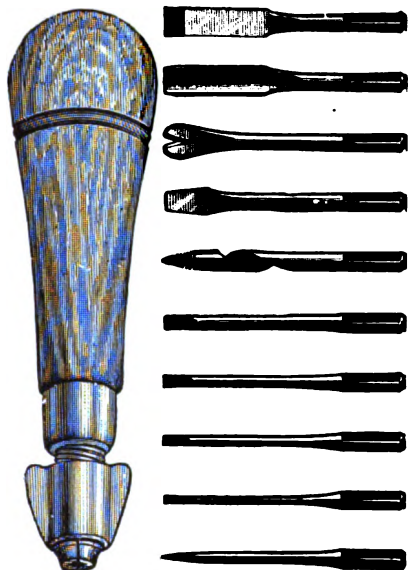


FIG. 1897. TOOL SET.

These Tool Sets are exceedingly useful for the shop, office or house. The cut shows the No. 1 Set (one-half size). Postage, on Nos. 1 and 4 Sets, 10 cts.; Nos. 2B and 6, 15 cts.

No. 1, \$0.75 (see cut); handle is cocobola wood, and tools first-class in every respect.

No. 4, \$0.50; same in general style and appearance as No. 1. Is not as good in quality or finish, but for many purposes answers very well.

No. 2B, \$1.15; same style as No. 1, but much larger and stronger. Handle measures 7 inches over all. Contains 2 Chisels, 1 Gouge, Screw Driver, Taper Reamer, Gimlet Bit, 2 large Awls, and Saw.

No. 6, \$0.95; same as No. 2B, excepting that the handle is of applewood instead of cocobola.

WHEN ORDERING please do not fail to give the Figure Number, and Size wanted. Long delays are not infrequent when the proper sizes and kinds are not specified—this is important.

JONES' PAT. REVERSIBLE CLUTCH SPIRAL SCREW DRIVER.



FIG. 1898. SPIRAL SCREW DRIVER.

On page 48 we show two styles of Spiral Screw Drivers. This Driver is made by the same parties, and has a decided advantage over any other driver of this class, in that it can be used for drawing as well as driving; can also be used as a common screw driver. Is strong and well made. Price, \$1.75; postage, 15 cents.

FIG. 1899.
ELECTRIC SOLDERING IRON.

This is a comparatively new article, but has met with considerable favor. The points of advantage claimed for it are, the saving of labor, the lightness of the iron, enabling the workman to do more work, besides saving the time required in changing and reheating ordinary irons. The cost of operation is said to be from 8 to 12 cts. per day, with current from city power stations, and where current is supplied from dynamos operated by the shop or factory, the cost is reduced to almost nothing. It is arranged to attach to any ordinary incandescent lamp socket.

SOLDERING SALTS.

The Yager Soldering Salts have been in use for several years, taking the place of acid. They save time and labor, and are really no more expensive than acid, with its offensive, unhealthful fumes and smells. In bottles— $\frac{1}{4}$ lb., \$0.35; 1 lb., \$0.60; 5 lbs., \$2.40; 10 lbs., \$4.50.

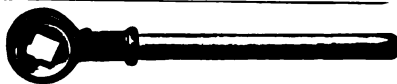


FIG. 1900. RATCHET WRENCH.

For many purposes around manufacturing establishments, there is no tool more valuable or necessary than a Ratchet Wrench. It is, however, not a tool that is in constant use, and up to the present time manufacturers of this class of Wrench have asked a price that was almost prohibitory.

We present here a new line of these Wrenches that for strength, convenience in handling, and finish, are superior to anything yet brought out, while the prices are very reasonable.

No.	Price.	Suitable for Nuts.	Length.
1	\$0.75	$\frac{1}{4}$ and $\frac{1}{2}$	7 in.
2	1.00	$\frac{3}{8}$ " "	8 " "
3	1.25	$\frac{1}{2}$ " "	10 " "
4	2.00	" " "	13 " "
5	3.00	" 1	16 " "



FIG. 1901. RATCHET TAP WRENCH.

Price, complete in Case, \$1.85.

Suitable for Taps $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{1}{2}$. Length of Wrench over all 7 inches.

NO NAME FOLKS—Every few days (and sometimes oftener) we receive a letter from some one who forgets to sign his name. If it is an order with money enclosed, we are pretty sure to hear from him later, wanting to know where the goods are; and sometimes the letters are not overly civil. If it is a letter of inquiry and the writer gets no answer, he thinks we are inattentive or careless, and as a result we are apt to lose what might be a good customer.



FIG. 1902. SPANNER WRENCHES.

These are drop-forged from bar steel, and are very useful for a number of purposes. Manufacturers of Machinery, Bicycles, etc., are using them quite extensively.

Diam. of Circle,	1	1½	1½	1½	2
Length over all,	4	4½	5	5½	6
Diam. of Pin,	½	¾	¾	¾	¾
Each,	\$0.18	.19	.20	.21	.22
Diam. of Circle,	2½	3	3½	4	
Length over all,	7	8	9	10	
Diam. of Pin,	¾	¾	¾	¾	
Each,	\$0.24	.28	.32	.36	

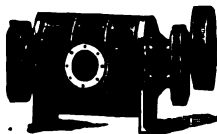


FIG. 1903. BLOWER.

The subject of Pressure Blowers is one of considerable magnitude, and at present we have a good deal to learn regarding it. We use two of these Blowers in our shop. For certain purposes they are invaluable.

The cut suggests a Rotary Positive Pressure Blower. The subject of Pressure Blowers is one of considerable

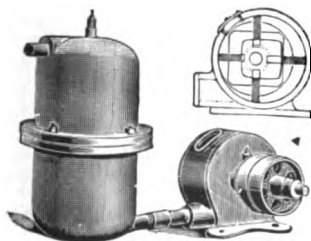


FIG. 1904.

POSITIVE PRESSURE BLOWER.

This style of Blower is used in many manufacturing establishments, gas melting furnaces and similar classes of work; gives pressure from ½ to 10 lbs., without running at an enormous speed. Circulars with prices and full description upon application.

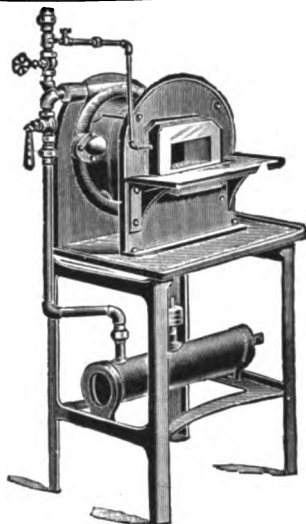


FIG. 1905. GAS FURNACE.

Gas Furnaces are made in great variety of styles and sizes. We have recently sold a number of these for brazing purposes, in connection with bicycle work.



FIG. 1906. STEEL FRAME BARROW.

On page 400 we illustrate and price a line of Steel Barrows. At the time of putting these in, we did not intend to show any other lines, but have reconsidered the matter and call attention here to the Champion Barrow, with Folding Steel Frame. It is the strongest Barrow of this type, and the price, quality considered, is very reasonable. Lighter and better than the ordinary Barrow. Wheels of steel; very strong.

With Wooden Tray, each, \$2.25; doz., \$24.00. Steel Tray, each, \$3.00; doz., \$32.50.

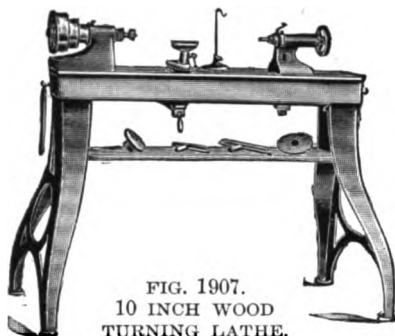


FIG. 1907.
10 INCH WOOD
TURNING LATHE.

This is designed especially for use in manual training schools, and is by long odds the nicest tool of its class ever put on the market. Complete descriptive circular and prices upon application.

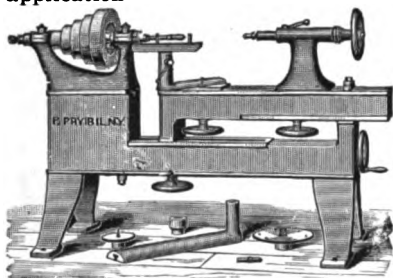


FIG. 1908. SPINNING LATHE.

This is an Extension Spinning Lathe, made in two sizes; 22 in. (44 in. when extended); 27 in. (60 in. when extended). Strong and stiff.

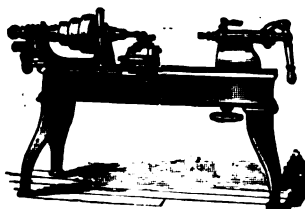


FIG. 1909. FORMING LATHE.

This is a special Lathe designed to turn articles of manufacture into ornamental shapes by means of a Forming Tool. Can be used for

Brittania and Brass Goods, and on other materials as well. Is usually operated by unskilled labor, and on many classes of work as much can be done in a day as on an ordinary lathe in a week.

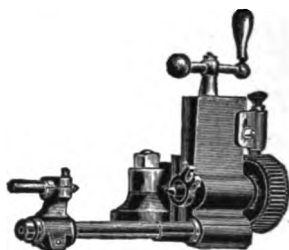


FIG. 1910. MILLING ATTACHMENT.

This is an Index Attachment for Lathes. Can be used for fluting taps, reamers, counterbores, etc., to make cutters, and do any light milling required in the milling-room or small shop. A very effective tool, moderate in price.

Price of Attachment, with Face Plate in center, \$40.50.



FIG. 1911. OPENING DIE HEAD.

For many kinds of work, and especially brass work, the Opening Die Head is a great saver of time and money. The prices below include one set of dies; the cost of extra dies is small.

No. 0,	\$40.00;	capacity to $\frac{1}{8}$ inch.
" 1,	50.00;	" " 1 "
" 2,	55.50;	" " $1\frac{1}{2}$ "

This machine is intended for milling the Joints in Butts and Hinges. Its use may be suggested for other purposes.

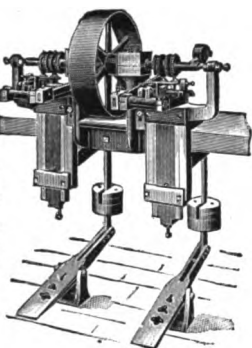


FIG. 1912. BUTT MILLING MACHINE.

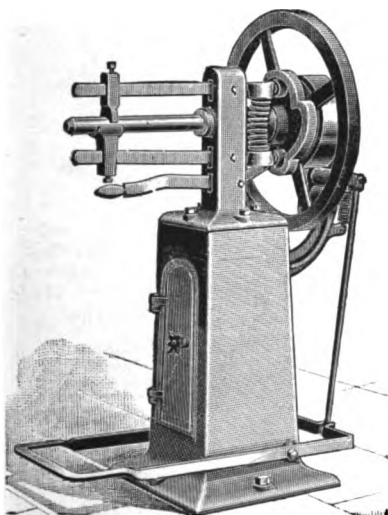


FIG. 1913.

FLUE WELDING MACHINE.

This machine makes inner and outer scarfs and welds smoothly. There are a great many of them in use giving the best satisfaction. One set of tools, consisting of Scarfing and Welding Swages and Spindle, for one size flue, is furnished with each machine. Power Machine, as shown in cut, \$100.00. Hand Machine, \$30.00. Hand Machine without Pedestal, \$60.00.

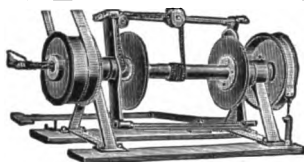


FIG. 1914. ROPE MACHINE.

This machine is for making Ropes of hay and straw, used in pipe foundries, etc., etc.

FIG. 1915.
BUTTON BACK
MACHINE.

This machine is intended for forming wire eyes in metal backs, and joining them automatically.

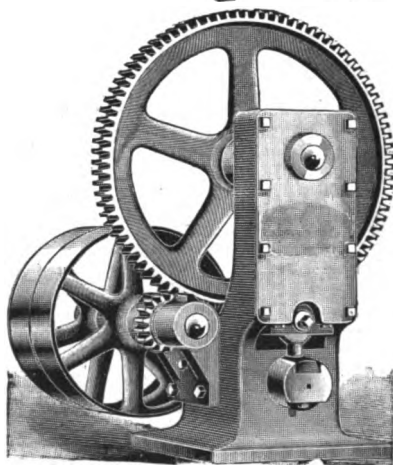
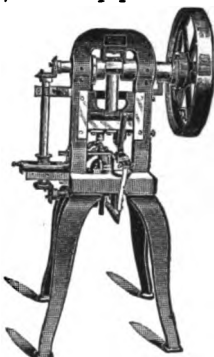


FIG. 1916. SPECIAL PUNCH.

Designed to punch holes $\frac{1}{4}$ wide by 1 inch long in edge of steam or gas pipe, for sizes from 3 to 5 inches. It might be used to advantage on other work of similar character.

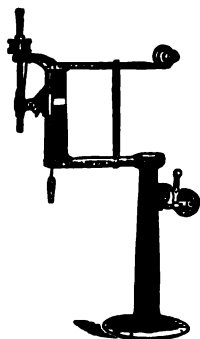


FIG. 1917.
SPECIAL DRILL.

This is a Sensitive Drilling Machine designed especially for work on light, bulky articles, such as bicycle and similar work.

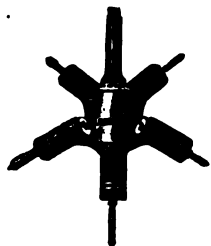


FIG. 1918. DRILL HEAD.

This is a Five-Spindle Revolving Drill Head for medium and light work; can be used to advantage in connection with the style of Drill Machines shown on pages 110 to 114.

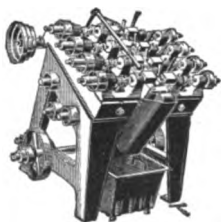


FIG. 1919. EIGHT-SPINDLE DRILL.

This Drill was originally designed for drilling bicycle chain links. Can be adapted for a large variety of small articles where two or more holes are desired on opposite ends. Capacity 5000 pieces per day. Works automatically.

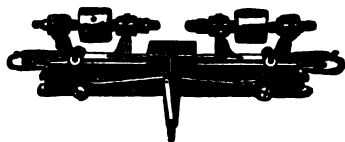


FIG. 1920. DRILLING LATHE.

This is a Double Head Lathe for drilling two holes at once. Cut shows back part of machine.

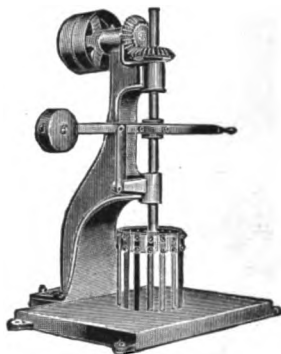


FIG. 1921.

MARBLE CUTTING MACHINE.

Intended for cutting holes in marble or similar material. Made in two or three sizes and styles.

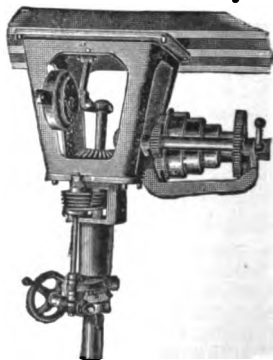


FIG. 1922. OVERHEAD DRILL.

Used for drilling in center of large pieces. The Post Drill (shown in Fig. 448) will in many places take the place of a Suspended Drill.

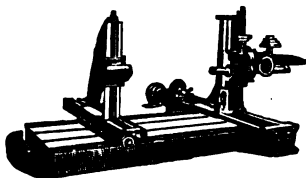


FIG. 1923. HORIZONTAL BORING AND DRILLING MACHINE.

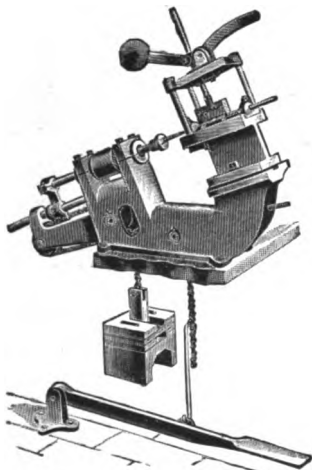


FIG. 1924. BUTT DRILL.

Designed for drilling for the pins in butts and hinges. The use of this Drill may suggest itself for many other similar purposes.

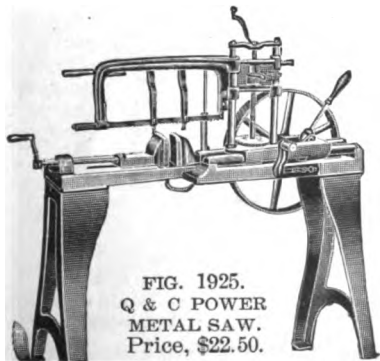


FIG. 1925.
Q & C POWER
METAL SAW.
Price, \$22.50.

This Machine has a Positive Automatic Variable Feed, which can be instantly changed, a positively horizontal stroke insuring square work, movable work-vise, allowing entire length of blade to be used, and an Automatic Stop when the piece is cut off. It will cut all metals up to 6 inches in diameter, and any shape.

STUBS' HACK SAW BLADES.

In making up pages 70 and 71, these blades were inadvertently left out; and although, as stated elsewhere, the hard type of blade, such as the "Star," "Griffin" and "Yankee" have largely taken the place of the Stubs' hack saw, we still sell a considerable number of the latter. These blades can be sharpened and used until worn out.

Size,	6	8	10	12	14	16
Ea.	\$0.20	\$0.30	\$0.40	\$0.50	\$0.60	\$0.80
Doz.	2.00	3.00	4.00	5.00	6.00	8.00

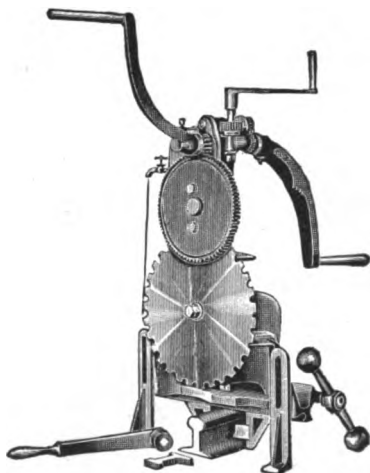


FIG. 1926. METAL SAW.

This is a Portable or Hand machine for cutting steel rails, beams, channels and shafting up to 7 inch. Used largely by railway companies and bridge builders. Are made also in a variety of sizes for power use.

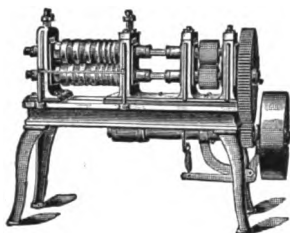


FIG. 1927. ROLLING MILL.

Made in great variety of styles and sizes; used for rolling sheet metals of all kinds, flattening wire, rolling blanks, etc., etc.

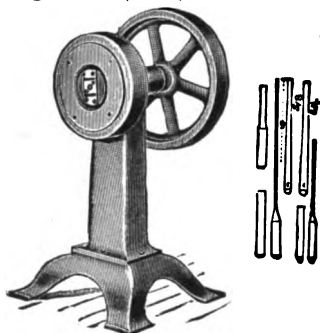


FIG. 1828.

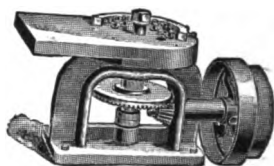
DAYTON SWAGING MACHINE

For Cold Swaging of Metals. Used for swaging bicycle spokes, tubes of brass, copper or steel up to 2 inches diameter, and of any required thickness. Does the work very rapidly, and improves the material. There are many purposes for which the use of this machine may be suggested.

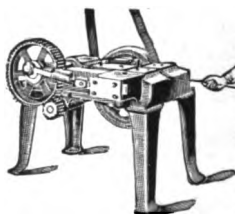


FIG. 1829. CHAIN MACHINE.

This machine is automatic. Five sizes are made, suitable for wire from Nos. 4 to 24. With proper tools will make various styles of chain.

FIG. 1930.
WIRE
STRAIGHT-
ENING
MACHINE.FIG. 1931. ROTARY SCREW-
THREADING MACHINE.

This will thread screws up to $\frac{1}{4}$ in diam. We can also furnish Reciprocating Screw-Threading Machines, for different sizes of work.

FIG. 1932.
HEADING MACHINE.

Designed especially for heading bicycle spokes, at the rate of about 40 per minute. Can furnish single and double end Headers for all sorts of purposes.

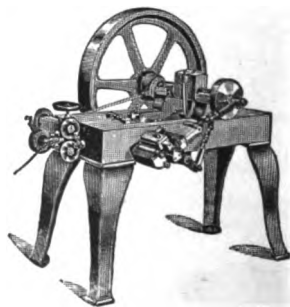


FIG. 1933. RIVET MACHINE.

Made in Single and Double Stroke, Plain and Geared, in great variety of styles and sizes.

FIG. 1934.
RACK CUTTING
MACHINE.

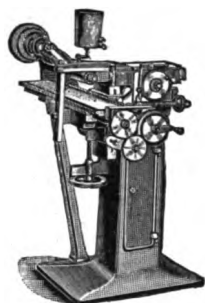


FIG. 1935.
KEY WAY
CUTTER.

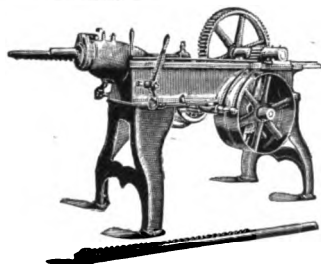
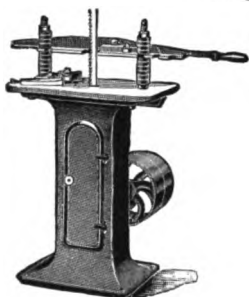


FIG. 1936. KNOWLES' KEY SEATER.

Either of the above machines will do as much work in an hour as can be done in the ordinary way in a day.

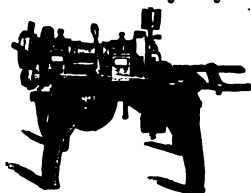


FIG. 1937. CUTTING-OFF MACHINE.

FIG. 1938. OLIVER.

This is a Foot Power Trip Hammer, or Oliver; can be used to good advantage for many kinds of work.



FIG. 1939.
RIVETING MACHINE

The cut represents an Elastic Rotary-Blow Riveting Machine, used in riveting together various articles of hardware, bicycle chains, tools, etc., etc.; made in various sizes and styles.

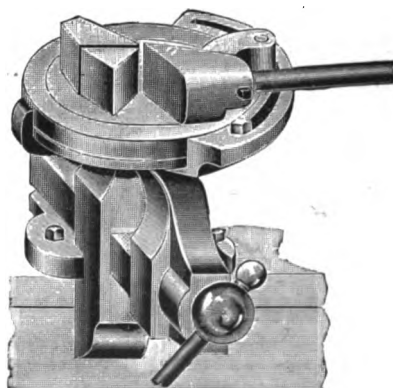


FIG. 1940.

BAND IRON AND WIRE BENDER.

Used for light iron work and wire. Can be screwed on bench or used in vise, as shown in cut.

FIG. 1941.
BOX NAILING
MACHINE.



FIG. 1945. LAUNDRY MACHINE.

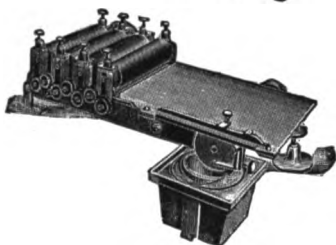


FIG. 1942. BOX GLUEING MACHINE.

This machine is used for glueing and folding paper boxes. It can be operated by a girl, and will glue from 8,600 to 15,000 boxes per day.

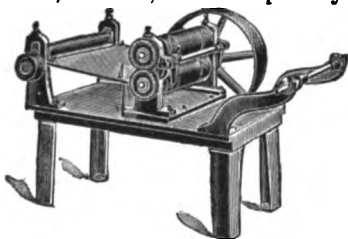


FIG. 1943. BOX CUTTING MACHINE.

This machine is used for cutting and scoring paper boxes.

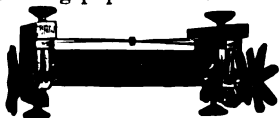


FIG. 1944. BENDING ROLLS.



FIG. 1946. SOAP PRESS.
Used for pressing soap and similar substances into cakes.



1947. BOOK STITCHING MACHINE.

SHELF HARDWARE.

Although we have not mentioned the fact elsewhere in this catalogue, we carry a very complete line of Shelf Hardware. The subject of Shelf Hardware is a broad one, and we do not mean to go into it here any more than to show a small but choice line of Locks, and two or three other items.

We are impelled to show these goods for the reason, that it is difficult to find in most places anything like a complete line of high-grade goods. We have in past years furnished a great many goods of this class to manufacturers, institutions and clubs.

In this connection we might say, that we will be pleased to furnish any information in our power in regard to any kind of goods in this class.

YALE LOCKS.

The Locks shown here are the celebrated Yale Locks, of the latest improved varieties, with the German Silver Yale Paracentric Keys. No two locks alike (unless especially ordered).

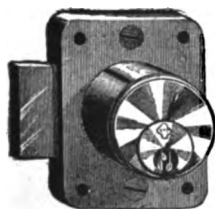


FIG. 1948.

NO. 511
CUPBOARD
LOCK.

Size $2 \times 1\frac{1}{2}$, for either $\frac{3}{4}$, $\frac{7}{8}$ or $1\frac{1}{4}$ in. thick wood. Ea., \$1.10; doz., \$11.00; postage, 6 cents.



FIG. 1949.

No. 511S.
SPRING
CUPBOARD
LOCK.

Same as above, but with Spring Bolt. Each, \$1.35; per doz., \$13.50.

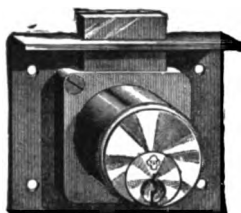


FIG. 1950.

No. 561,
DRAWER
LOCK.

Size $1\frac{1}{2} \times 2\frac{1}{2}$, for either $\frac{3}{4}$ or $\frac{7}{8}$ in. wood. Each, \$0.90; doz., \$9.00.

We have the above style of Lock in smaller size, $1\frac{1}{2} \times 2$ in. Each, \$0.75; per doz., \$7.50. This is one of the most popular Locks we have.

FIG. 1951.
SPRING
DRAWER
LOCK.

Same as Fig. 1950. Each, \$1.00; doz., \$10.50.

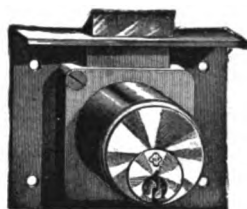


FIG. 1952.

No. 541,
DESK AND
CHEST.

Size $1\frac{1}{2} \times 2\frac{1}{2}$, for either $\frac{3}{4}$ or $\frac{7}{8}$ in. wood. Each, \$1.10; doz., \$11.00.

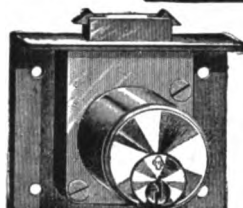


FIG. 1953.

NO. 5241, CHEST AND DESK.

Size $1\frac{1}{2} \times 3$, for $\frac{3}{4}$ and $\frac{7}{8}$ in. wood. Each, \$1.20; per doz., \$12.00.

MASTER AND PASS-KEY WORK.

In many places where large numbers of locks are used, it is desirable to have either Pass or Master-Keyed Locks. By Pass-Keyed Locks is

meant that the keys are all alike; this saves carrying about a heavy bunch of keys. Master-Keyed Locks are locks that are arranged in sets of any given number, all of the locks being different, and having keys of their own, the set being furnished with one or more master keys that will open any of the locks. Following is the system as used in our factory:

The different foremen in the Machine, Casting, Tool Room, Engine, Draughting, Pattern-Making, and other departments, have keys of the various locks used in their departments. The superintendent, officers and watchman carry two or three Master Keys, fitting practically every lock in the building.

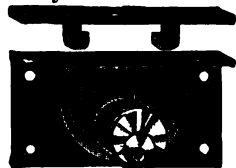


FIG. 1954.
No. 521,
HEAVY CHEST
LOCK.

Size 2x4, for
either 1½, 1½
or 1½ wood.
Each, \$1.85;

per doz., \$19.50. Postage, 12 cents.

PLAIN CYLINDER LOCKS.

These Locks are also made by Yale & Towne, having plain cylinders and a different style of key. They are secure, and well adapted to many classes of work. Like the locks before mentioned, they are all brass.

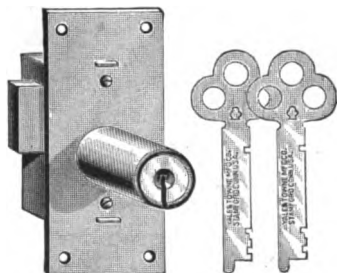


FIG. 1955. CUPBOARD LOCK.

No.	Each.	Per Dozen.	Size.
WA-102	\$0.45	\$4.80	2½x1½
WA-102	.50	5.40	3x1½
WA-104	.55	6.00	3½x2
WA-106	.65	7.20	4x2½

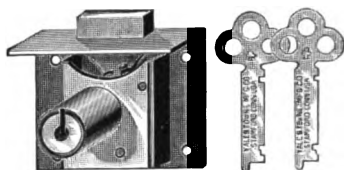


FIG. 1956. DRAWER LOCK.

No.	Each.	Per Dozen.	Size.
RA-296	\$0.30	\$3.00	1½ in.
RA-302	.40	4.00	2 "

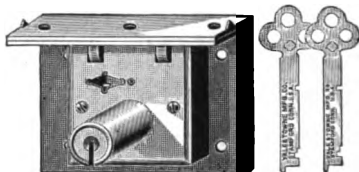


FIG. 1957. CHEST LOCK.

No.	Each.	Per Doz.	Size.
SA-150	\$0.40	\$4.20	1½ in.
SA-151	.45	4.50	1½ "
SA-152	.55	5.40	2 "
SA-153	.65	6.30	2½ "
SA-155	.85	8.40	3 "
SA-156	.95	9.60	3½ "
SA-157	1.10	10.80	4 "

All numbers to SA-153 are made for ¾ inch wood; SA-155 and 156, for 1, 1½ and 1½; and SA-157, for 1½, 1½ and 1½ inch wood.

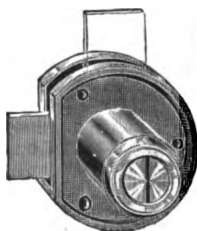


FIG. 1958.
UNIVERSITY
DRAWER
AND CUPBOARD
LOCK.

Is especially adapted for locker or closet doors. In drawer locks the bolt projects ½ inch; in cupboard, 1 inch. Can be furnished to order with bolt of any required length.

Cupboard.	Drawer.	Wood.	Each.	Doz.
5034	34	¾ in.	\$0.85	\$9.00
5078	78	1 in.	.85	9.00
5054	54	1½ "	.95	10.00

These locks Master Keyed cost \$2.00 per dozen extra.

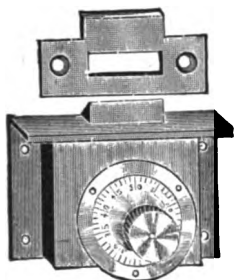
COMBINATION LOCKS.

FIG. 1959. COMBINATION SPRING DRAWER OR CUPBOARD LOCK.
No. 181. Size $2\frac{1}{2}$, all brass, heavy. Each, \$1.35; dozen, \$13.50

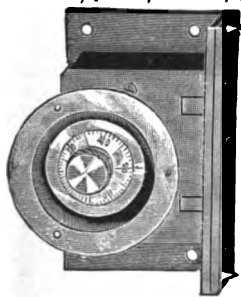


FIG. 1960. COMBINATION CHEST LOCK.

No. 189; size $3 \times 2\frac{1}{2}$, all brass, heavy. Each, \$1.75; dozen, \$18.00; postage, 15 cents.

No. 187; size, $4 \times 2\frac{1}{2}$. Each, \$2.25; dozen, \$24.00; postage, 20 cents.



FIG. 1961.

CHAMPION CASH OR DEED BOXES.
These Boxes are extra heavy, well finished, and provided with Combination Lock. The measurements given are inside.

No.	Each.	Size.
9	\$3.00	$9 \times 6 \times 3\frac{1}{2}$
10	3.20	$10\frac{1}{2} \times 7 \times 4\frac{1}{2}$
12	3.40	$12 \times 8 \times 5\frac{1}{2}$
14	3.85	$14 \times 10 \times 6\frac{1}{2}$
16	4.25	$16 \times 11\frac{1}{2} \times 4\frac{1}{2}$

LOCKS AND LATCHES.

The Yale Locks shown here are the latest improved pattern, with German Silver Yale Paracentric Keys. They are without a doubt, the best goods of this class now on the market. Any of these locks can be furnished with extra keys, and Pass or Master keys.

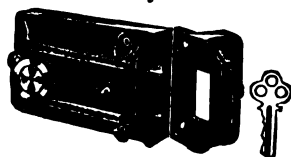


FIG. 1962. RIM NIGHT LATCH.

Size, $2\frac{1}{2} \times 3\frac{1}{2}$, three keys. If reversed bevel is wanted, it must be stated in order.

No. 42, \$1.50; Japanned iron case.

No. 52, \$2.75; all bronze.

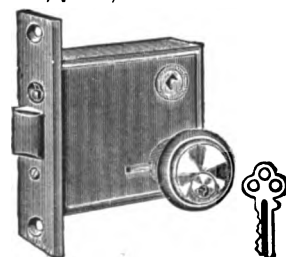


FIG. 1963. MORTISE NIGHT LATCH.

No. 6, \$2.50; operated from without by key, and from within by small bronze knob.

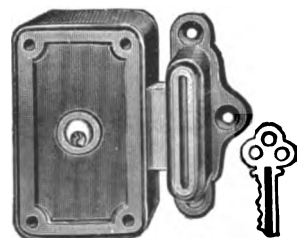


FIG. 1964. STORE DOOR LOCK.

No. 12, \$2.75; $4 \times 2\frac{1}{2}$ inches. No. 4, \$3.25; 5×3 inches.

BOHANNAN LOCKS AND LATCHES.

These goods are of most excellent quality, and, excepting the Yale, are the best made goods we know of.

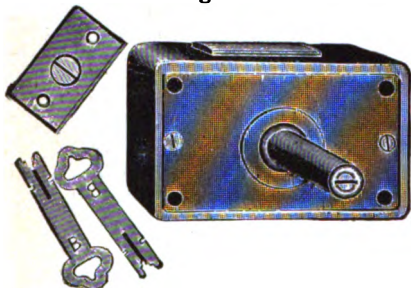
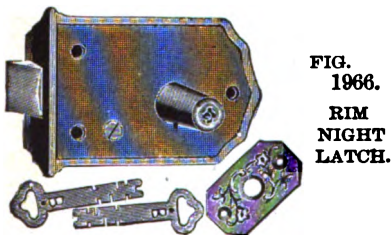


FIG. 1965. RIM STORE DOOR LOCK.
No. 199, \$2.00. Size $4\frac{1}{2} \times 2\frac{1}{2}$; 7 tumblers, bronze bolt and knob. Opens and locks from inside without key.



No. 156, \$0.75; iron bolt, brass knob.

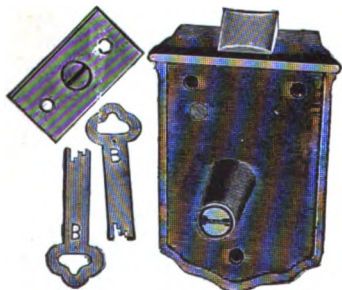


FIG. 1967. RIM NIGHT LATCH.
No. 165, \$1.00; heavy bronze bolt, brass knob, has 4 tumblers. Can furnish this latch made of all bronze metal; price, \$1.75.

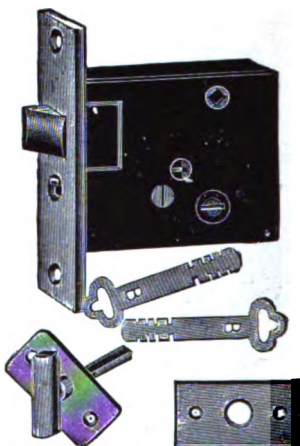


FIG. 1968. MORTISE NIGHT LATCH.
No. 175, \$1.65; bronze bolt and knob.

SHUT THAT DOOR! BUT
DON'T SLAM IT !!!

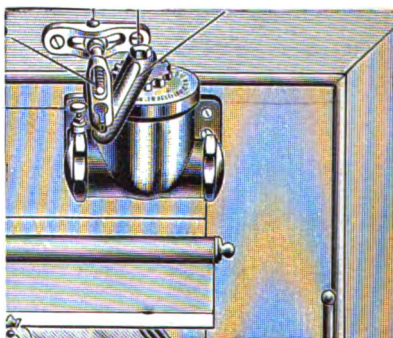


FIG. 1969.
BLOUNT DOOR CHECK AND SPRING.
We have sold hundreds of these, and believe them to be the best Check and Spring ever placed on the market.

Size A, \$3.20; used for Light Doors.

" B, 4.00; " " Medium "
" C, 4.80; " " Heavy "
" D, 6.40; " " Extra " "

Descriptive Catalogue Free.

PADLOCKS.

All Pad-Locks are priced with 2 keys to each.



FIG. 1970. CHAMPION 6-LEVER.

This style of Lock is used largely by the U. S. Government, in various Departments, is a good lock and very reasonable in price; made in but one size, 2½ inch. Each, \$0.60; per doz., \$6.00.

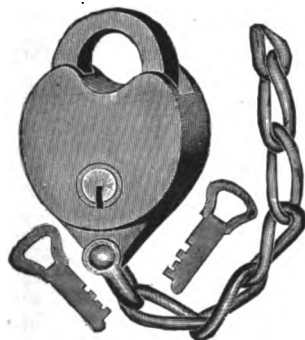


FIG. 1971.

BRONZE METAL SPRING PADLOCK.

The above cut represents a style of Padlock that is very popular for general purposes. They are very strong and secure, having three tumblers. The sizes given are in width, the most commonly used sizes being the 2 and 2½ inch.

PRICES, PLAIN.

No.	071	072	073	074	078
Size,	1½	1½	1½	2	2½
Each,	\$0.45	\$0.65	\$0.75	\$0.85	\$0.95
Doz.,	4.80	6.80	7.80	8.60	9.40

PRICE, WITH CHAIN.

No.	071-A	072-A	073-A	074-A	078-A
Size,	1½	1½	1½	2	2½
Each,	\$0.55	\$0.75	\$0.85	\$0.95	\$1.05
Doz.,	5.60	7.80	8.80	9.60	10.40

EXTRA SMALL AND EXTRA LARGE PADLOCKS.

We carry in stock a line of both small and large locks, same style as shown in Fig. 1971, but with brass keys. These are of most excellent quality, and can be depended upon both for security and strength.

PRICES, PLAIN.

No.	1	0	A	82	92	96
Size,	¾	¾	1	2½	2½	3 in.
Each,	\$0.25	\$0.28	\$0.30	\$0.90	\$1.65	\$2.20
Doz.,	2.80	2.90	3.05	9.40	17.20	23.20

FIG. 1972.
AUTOMATIC.

This is the best cheap lock that we know of. Although very low in price, it is well made and durable. Made in two sizes, about 1½ and 2 in. in width. The 1½ inch lock is used for Bicycle and similar purposes, the 2 inch for general purposes.

No. 406, each, \$0.30; dozen, \$3.00; steel, dark finish; size, 2 inch.

No. 398, each, \$0.25; dozen, \$2.50. Same as No. 406, but 1½ inch.

No. 407, each, \$0.45; dozen, \$4.50. Same as No. 406, but brass.

No. 400, each, \$0.35; dozen, \$3.50. Same as No. 398, but brass.

No. 3980, same as 398, but with 2 ft. chain for bicycles. Each, \$0.45; dozen, \$4.50.

No. 411, same as 400, but nickel-plated on brass, and with chain for bicycle. Each, \$0.60; dozen, \$6.00.



FIG. 1973. SPECIAL LOCK.

This Lock has very large shackle; is used largely for grating and special iron work; three tumblers; size, 2½ inch; made of cast bronze metal.

Each, \$0.95; doz., \$10.20.

With chain, add 15 cents, or \$1.25 per dozen.

CHEST TRIMMINGS.

We show here a small line of goods suitable for Tool and other Chest trimmings.



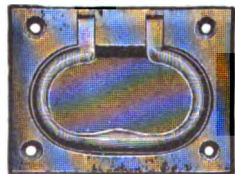
FIG. 174. CHEST CORNERS.

Nothing adds to the appearance—and strength as well—of a handsome Tool Chest as these Metal Corners. They are made of solid bronze metal, heavy, handsomely finished and polished. We have lately changed the style of the bottom corner, making it wider, so that it extends further up than the cut shows.

Set No. 1, \$3.60 (12 pieces); suitable for medium Chests.

Set No. 2, \$4.00 (12 pieces); suitable for medium and heavy Chests.

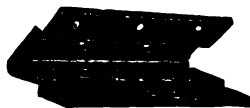
Set No. 3, \$4.75 (8 pieces); suitable for heavy Chests.

FIG. 175.
FLUSH CHEST
HANDLES.

No. 100, per pair, \$2.00; heavy, genuine bronze metal; size, about $3\frac{1}{2} \times 4\frac{1}{2}$ in. Strong and handsomely finished. Surface Chest handles same as above, per pair, \$1.75.

FIG. 176.
FLUSH
BRASS
HANDLES.

Size,	$3\frac{1}{2}$	4	$4\frac{1}{2}$ in.
Per Pair,	\$0.80	\$0.90	\$1.10

FIG. 177.
RABBETTED STOP CHEST HINGES,
BRONZE METAL.

One size only, suitable for medium and heavy Chests. Per Pair, \$2.00.

IMITATION TRUNK TRIMMINGS.

We have had a good many inquiries from certain localities for Trunk Trimmings, and understand that some railroads do not allow tool chests to go as baggage, unless fitted out to look like trunks. We can furnish these trimmings in sets, the following comprising a set: 3 Hinges, 8 Corner Plates, 4 Center Plates, 2 Clasp or Bolts for Face of Chests, 1 Brass Lock (extra quality), 2 Keys, 4 Loops, 2 Stitched Harness Leather Handles, suitable Nails, etc.

Set No. 1, for medium and small chests; price, complete, \$2.50.

Set No. 2, for large chests; price, complete, \$3.00.

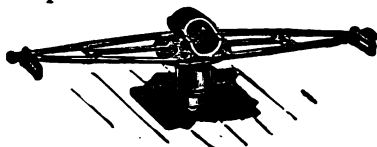
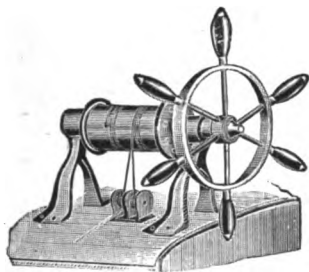
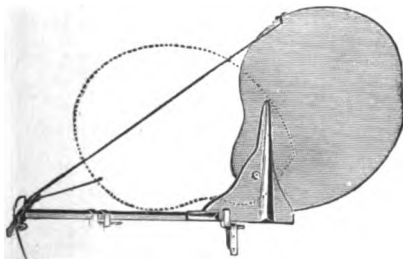
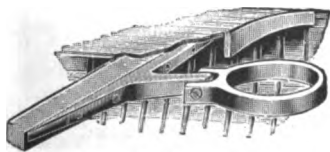
CABINET TRIMMINGS.

These goods are beautiful in design and finish. We carry in stock Gold Finish only. The styles are constantly changing, and the above illustrations merely give an idea of style. Orders will be filled with styles as near like cuts as possible.

As an aid in making selections we print sizes over all, giving first length then depth.

BOAT AND CANOE HARDWARE.

We can furnish a very complete line of the necessary, useful and ornamental fixtures for Canoes, Row Boats, Sail Boats and Steam Yachts, and show here small illustrations of Steering Gear, Rudder, Wheel, Row Locks, etc. Price list sent for 2-cent stamp.

**FIG. 1978. STEERING GEAR.****Fig. 1979. STEERING WHEEL.****FIG. 1980. DROP RUDDER.****FIG. 1981. DROP MAST HOLDER.****FIG. 1982.****HALLIARD GUIDE.****FIG. 1983. ROW LOCK.****FIG. 1985. MASTHEAD GEAR.****FIG. 1984. CLEAT.****FIG. 1986. MAST PLATE.****FIG. 1987. DOUBLE BLOCK.****FIG. 1988. PROPELLER WHEELS.**

We furnish these to order in iron or composition, from 12 to 26 inches diam., with 2, 3 or 4 blades, as desired.

INQUIRIES.—We have endeavored throughout this book, to answer a great many of the inquiries commonly received by us, but we wish it understood that we are at the service of our patrons and will cheerfully give any information that lies in our power to obtain.

OTHER TOOLS.

There are many other lines of Tools that we handle, some of which are carried in stock, others furnished to order, still others we do not care to handle, but can often furnish our customers with information regarding them. Among them are:



FIG. 1989. SLATERS' TOOLS.



FIG. 1990. STONE CUTTERS' TOOLS.

FIG. 1991. LINEMAN'S PLIER.
(Insulated), Price, \$2.00.

TELEGRAPH TOOLS,
TINNERS' TOOLS,
ELECTROTYPERS' TOOLS,
ELECTRICIANS' TOOLS,
COOPERS' TOOLS,
CARVERS' TOOLS,
ICE TOOLS,
JEWELERS' TOOLS,
LEATHER TOOLS,
LUMBERMENS' TOOLS,
PAVERS' TOOLS,
PIANO MAKERS' TOOLS,
PLUMBERS' TOOLS,
PUMP MAKERS' TOOLS,
ETC., ETC., ETC.

MACHINERY.

BAKERS,
BARREL,
BOOK-BINDERS,
BOX-MAKERS,
BRAIDING,
BRUSH-MAKERS,
BUTTON,
CANE-SPLITTING,
CANNING,
CARPET,
CARTRIDGE,
CHOCOLATE,
CLOCK,
COFFEE,
COMB,
CONFECTIONERS,
CORDAGE,
ELECTROTYPING,
STEREOTYPING,
EMBOSSING,
GLUE,
GUN,
HOOK AND EYE,
KNITTING,
LEATHER,
MATCH,
MACARONI,
NAIL AND TACK,
PAINT,
PAPER BAG,
PAPER BOX,
PAPER MILL,
PIN,
RIVET,
ROPE,
RUBBER,
SHOE PEG, AND
WIRE COVERING
MACHINERY.

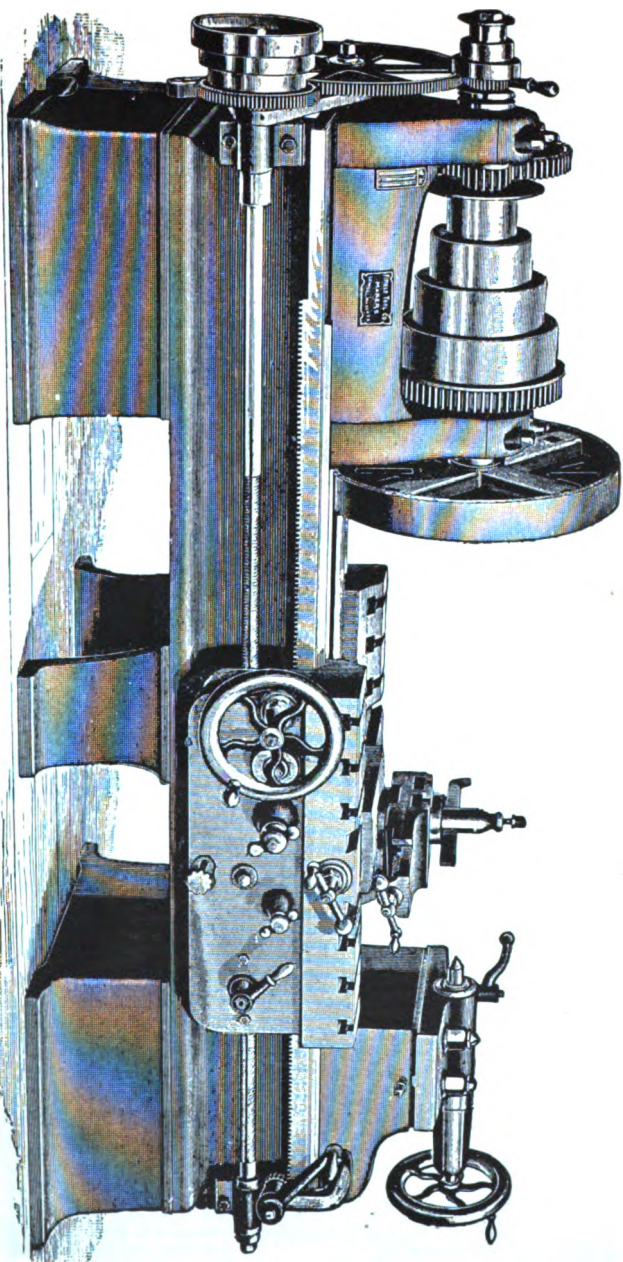


FIG. 2027. 30 INCH FILDERS LATHE.

The above cut represents a 30 Inch Fildes Tool Co. Lathe. These Lathes are made from 17 to 64 inch swing; they are built from new and heavy patterns, with a combination of all the modern improvements. The bearings are large and long, spindles are forged steel, as well as many of the other parts that require great strength and are exposed to wear. Prices, photographs and full information furnished upon application.

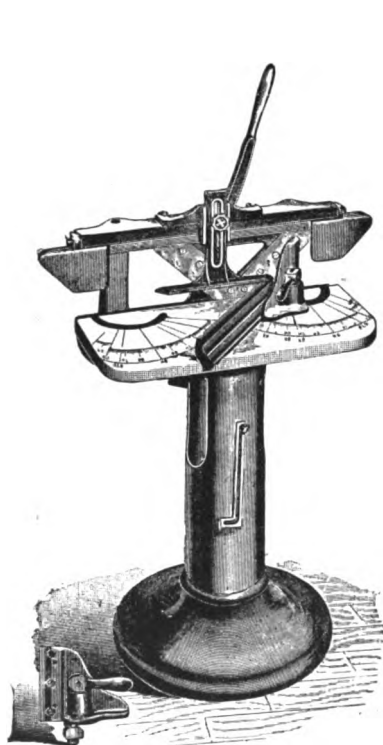


Fig. 2050. Front View.

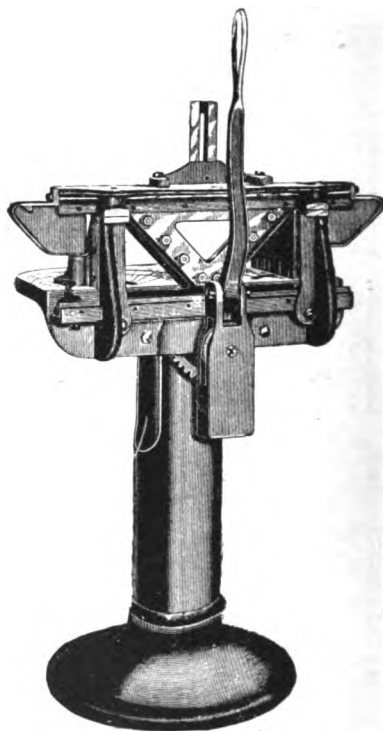


Fig. 2050. Back View.

UNIVERSAL TRIMMING MACHINE.

The Trimming Machine is one of the Modern Tools which has made for itself a permanent place in the most advanced wood working shops.

It Secures Accuracy. It Saves Time. It Makes Money.

The desirability of obtaining a required angle by one light cut on the trimming machine rather than by several repeated attempts with the hand plane, was so apparent, that the first primitive machines which were designed for this purpose, found an extensive sale with all their defects.

About three years ago we designed and built a universal trimmer. Every machine of this character then on the market was a combination of trappy contrivances. The trimmer we made at that time was the first one constructed on correct mechanical principles. To the superior design, accurate construction, and widened range of work made possible of accomplishment, we attribute the sale of 2,000 of these machines during the past three years of extreme business depression.

Profiting by the opportunities afforded of

learning the possibilities and requirements of the most progressive pattern shops, we have designed and placed upon the market a trimming machine as much superior to our former production as that machine was superior to its predecessors.

Bearings—Entirely Adjustable, Accuracy permanently achieved.

The primary and most essential feature of a trimming machine is its accuracy, which can not be secured if the bearings are loose, and sliding surfaces will become loose by constant use. No trimmer heretofore made has any provision for taking up this wear. By two ingenious, yet simple, patented gibs, this looseness is entirely overcome in our present machine, and the working parts may be kept in perfect alignment.

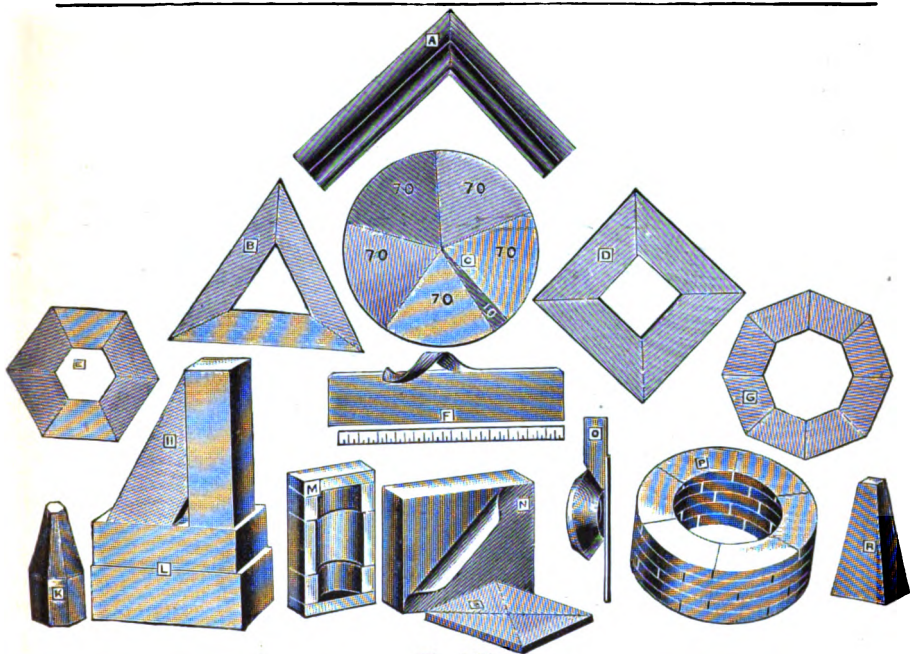


Fig. 2061.

The Figures shown above were actually made on our Trimming Machine. The Blocks were photographed and this cut made from photograph. They suggest only a few of the desirable cuts which can be advantageously made on our Trimmer.

Accurate work can be secured when the machine is new.

Accurate work can be secured when other trimmers would have become worn and useless.

Steel Shoes—Beveled Edges, Easily Adjustable.

Gauges—Located Positively, Located Accurately, Located Instantly.

Angles—Every Separate degree plainly shown and accurately located.

Realizing that it is often desirable to use the machine for making accurate templates for the angles on bevel gears or other pattern work, we have very carefully graduated the machine from 80 to 135 degrees. We have given every separate degree, which enables the operator to obtain any desired angle, in addition to the eight angles most commonly used, which are the only ones marked on any trimmer previously placed on the market. These degrees are laid off from a 90° index circle, and can be relied upon as more accurate than many bevel protractors now in use on ordinary machine work.

Weight of Machine, 300 Lbs.

Universal Attachment—For Crown Mouldings; for Irregular Patterns.

Our trimming machine has met with almost universal favor in planing mills. For stair work, and a great variety of general and special planing mill work, it possesses peculiar advantages. One feature which is especially desirable, is the accurate yet rapid joining of crown moulding. It can be placed in position instantly, and any number of accurate crown moulding joints can be made as quickly and easily as the same number of small straight blocks could be trimmed on other machines.

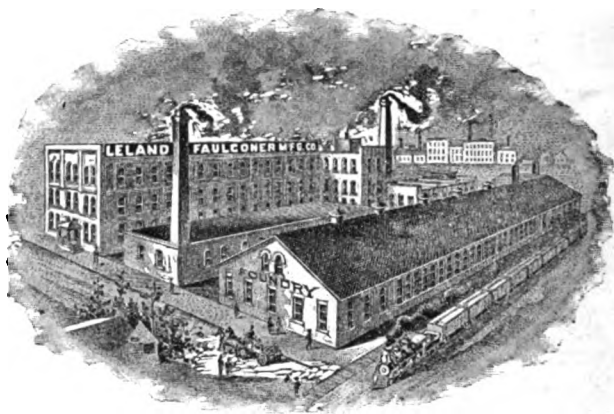
This fixture adds materially to the scope of possible work on a universal trimming machine.

Graduations—Linear Scale on side gauges.

Lever—Unique, Powerful, Convenient.

The lever can be instantly adjusted to any position by an improved, patented device. The grooves on the side of the beveled ratchet wheel are milled to fit the tongues on the lever, and thus a more positive, uniform and accurate adjustment is secured and all lost motion is avoided.

Circular and Prices upon application.



ABOUT OUR FOUNDRY.

**It has Interested some People.
Perhaps it will You.**

A FOUNDRY THAT IS RUN BY RULE AND NOT BY CHANCE.

**IT IS NOT WHAT YOUR CASTINGS COST,
BUT WHAT YOUR FINISHED PRODUCT COSTS,
THAT MAKES YOU RICH.**

FOUNDRY FEATURES.

WE have a complete Foundry Plant, equipped with the most approved facilities for making high grade Machine Tool and Miscellaneous Gray Iron Castings.

The Foundry Building is 262x56 ft., with a cupola end 64x40 ft. With the exception of a brick wall around the cupola end, and around the core-room, the building is constructed entirely of steel and glass. It is absolutely fire-proof, and is equipped with the latest and most advanced modern facilities. This equipment includes Keep's Testing Apparatus; Brown & Sharpe Mfg. Co's Core Ovens and Annealing Furnaces; The Craig-Ridgway

Steam Hydraulic Crane and Elevator; the Connersville Cycloidal Blower with Vertical Engine connected direct, and other appliances of the same high grade.

We supply castings to **manufacturers** of machinery, either in the Wood Working, Agricultural, or General Machine Tool Lines.

We have special advantages for making fine, light castings, such as are used on Sewing Machines, Typewriters, and Cash Registers, and any other fine work where the quality is improved by **annealing**. The cost of manufacture is materially reduced by having castings uniformly soft for cutting, milling, boring, facing, or drilling, and yet smooth, fine grained and strong.

Castings that are difficult to make are especially solicited, such as Steam Cylinders, Tubes or Rolls requiring a fine finish, and any large, round, square or irregular shaped sections from which it is usually difficult to secure sound castings.

We constantly endeavor to make castings the **size of and like the patterns**.

We are entirely familiar with the conditions and requirements of all the above work.

Kindly give us a trial and we will **save you money** in the machine shop. Our castings will require very little work to prepare them for the finished product, and much of the Lathe, Planer, and Milling Machine work will be materially reduced, because the castings will conform closely to the pattern, will be very uniform in hardness, and comparatively free from blow holes and other imperfections.

We solicit your orders in the belief that our work will commend itself to your approval. We make a specialty of manufacturing castings for parties who **consume large quantities**, and shall adapt the **quality** of our castings to the **requirements** of our customers. Our aim will be to give our customers **what they want** at reasonable prices for quality required.

If you are interested in machine work; if you use castings; if good castings would increase your profit, and at the same time improve the quality of your output, we solicit your correspondence.

Leland & Faulconer Mfg. Co.,

480 to 500 Trombly Avenue,

DETROIT, Mich.

It costs money to clean and finish coarse, rough, ugly castings. Such castings are dear at any price. We don't make that kind.

TWO THINGS WE DO.

ITEM I.

DESIGNING, IMPROVING, PERFECTING.

Many inventions and devices, having great merit in themselves, prove failures as commercial ventures. There are several reasons for this, but one of the prime causes lies in the fact that too much time and money are thrown away in designing and perfecting.

A special machine was brought to us the other day, upon which the inventor had spent upwards of \$12,000 and over two years in time. This machine could have been perfected and developed in one-eighth of the time and for one-tenth of this sum if brought to us, or any other *first-class* shop, in the first place.

We have done a great deal of work in this line, and offer our services to persons desiring this kind of talent.

Among other things that we have designed or re-designed, improved and perfected in the past few years, are a Typewriter, Repeating Rifle, Gasoline Engine for bicycle, Flax Cleaning Machine, Type Setting Machine, Button Fastener Machinery, Special Punching Machinery, Corrugating Machine, Rotary Engine (a good one too), etc., etc.

Can we be of any assistance to you on these lines?

ITEM II.

MANUFACTURING.

Our plant is essentially a manufacturing one. We manufacture fine machinery for the market. Our equipment is modern and well nigh perfect, comprising all styles of Milling Machines, Universal and Surface Grinders, Testing Machines, etc., etc., in fact is "up to date" in all respects. We manufacture nothing but the best goods in their respective lines, and our chief aim is to produce these goods at the lowest possible price. We are prepared to a certain extent to manufacture for others—in quantities—anything in the way of Machinery, Tools and Devices such as we can produce to the best advantage.

It is often a great deal more advantageous to have these goods made by parties who are well equipped for this work, than to spend all one's capital in putting up and equipping plants. The money and time (which is in many cases of paramount importance) spent in this way might be much more profitably employed in introducing and pushing the sale of the goods.

We are not in a position to manufacture agricultural implements, anything made of wood, or rough, common machinery.

LELAND & FAULCONER MFG. CO.

**MACHINERY AND TOOLS,
DESIGNERS AND MANUFACTURERS OF**

**MACHINE TOOLS, SPECIAL MACHINERY, DEVICES AND FIXTURES,
DETROIT, MICH., U. S. A.**

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